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DEPARTMENT OF DEFENSE APPROPRIATIONS FOR 1990

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE

COMMITTEE ON APPROPRIATIONS

HOUSE OF REPRESENTATIVES

ONE HUNDRED FIRST CONGRESS

FIRST SESSION

SUBCOMMITTEE ON THE DEPARTMENT OF DEFENSE

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Printed for the use of the Committee on Appropriations

U.S. GOVERNMENT PRINTING OFFICE

21-582 O WASHINGTON : 1989

H 181-7

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DEPARTMENT OF DEFENSE APPROPRIATIONS FOR 1990

WEDNESDAY, MAY 3, 1989.

AUTOMATIC DATA PROCESSING PROGRAMS—OVERVIEW

WITNESS

CYNTHIA KENDALL, DEPUTY COMPTROLLER FOR INFORMATION RESOURCES MANAGEMENT, OFFICE OF THE DEPARTMENT OF DEFENSE COMPTROLLER

MOTION TO CLOSE

Mr. MURTHA. The committee will come to order.

Mr. Hefner?

Mr. HEFNER. Mr. Chairman, I move that the hearing today, May 3, 1989, and those portions of the hearings scheduled for May 4, May 10, May 11, May 16, and May 17, which involve classified material, be held in executive session because of the classification of the material to be discussed.

In addition, I move that the transcripts and related materials developed in the intelligence hearings be handled in accordance with the Appropriations Committee's special interim procedures for protection of intelligence information.

Mr. MURTHA. The clerk will call the roll.

[The clerk proceeded to call the roll.]

Mr. MURTHA. Madam Reporter, let the record show that on this vote Mr. Murtha, Mr. Dicks, Mr. Hefner, Mr. AuCoin, Mr. Sabo, and Mr. McDade voted aye.

Six Members having voted in the affirmative, this hearing is now closed.

INTRODUCTION

Today the committee will conduct a hearing in two parts on DOD automatic data processing resources.

This area involves primarily off-the-shelf commercial computers that are used for base-level operations such as personnel, pay, logistics, and finance. Not included are computers that are embedded into weapon systems, part of command and control networks, or tactical computers for the battlefield.

The first session will address management oversight of these resources by the Office of the Secretary of Defense for which $8.9 billion is budgeted in fiscal year 1990. Then we will focus on Army programs, on which a number of problems have recently surfaced.

The hearing will be conducted in open session since no classified information is involved. The committee last conducted a hearing on DOD ADP programs two years ago.

The first witness today is Ms. Cynthia Kendall, who is the Deputy Comptroller of the Defense Department for Information Resources Management. In this capacity, she is the Department's top official responsible for DOD ADP programs.

Ms. Kendall, it is a pleasure to have you join us today. We will put your prepared statement into the record. Would you like to make any opening remarks?

Ms. KENDALL. Mr. Chairman, I am pleased to be here today before the committee. I will submit my statement for the record and I am ready to take questions now.

[The statement of Ms. Kendall follows:]

STATEMENT OF
DEPARTMENT OF DEFENSE
DEPUTY COMPTROLLER
INFORMATION RESOURCES MANAGEMENT
CYNTHIA KENDALL

HEARING BEFORE THE SUBCOMMITTEE
ON DEFENSE
HOUSE APPROPRIATIONS COMMITTEE

May 3, 1989

STATEMENT BY THE DEPUTY COMPTROLLER
INFORMATION RESOURCES MANAGEMENT

Introduction

Mr. Chairman and members of the Subcommittee, I am pleased to appear before you today to discuss the status of automated information system (AIS) management in the Department of Defense (DoD).

The Comptroller is the Senior Information Resources Management (IRM) Official in the Department. His office is assigned policy responsibility for all general purpose information technology in the DoD. As the Deputy Comptroller for Information Resources Management, I am charged with carrying out this responsibility on a day-to-day basis.

We last addressed this Subcommittee in April 1987. Recognizing the growing role of AIS's in the Department, the size and significance of AIS funding, and AIS funding related decisions, the IRM function has since been elevated within the Department's organizational structure. To accomplish this, the Comptroller upgraded the Director of Information Resources Management (IRM) to the level of a Deputy Assistant Secretary, reporting directly to the Comptroller. In addition, the IRM staff was functionally realigned to focus on specific IRM responsibilities. In the next several minutes I will address management actions taken by the Comptroller that are particularly noteworthy. Specifically, I will:

1. Review strengthened Department policies and procedures for the management of automated information systems;

2. Describe our initiative on the future managerial direction of IRM;

3. Summarize particular DoD resource management programs that have been of interest to the Subcommittee; and

4. Review increased oversight initiatives for DoD major automated information system programs.

Strengthened Department Policies and Procedures

Mr. Chairman, the need to place special emphasis on strengthening AIS management policy and the management of complex AIS programs has been long recognized by this Subcommittee and the Department. In the past two years, the Department has made significant progress which I would like to summarize for you. We have institutionalized:

1. A new AIS Strategic Planning policy;

2. An updated AIS Life-Cycle Management policy;

3. A new AIS Program Baselining policy and procedure;

4. An updated End User Computing policy; and

We are currently coordinating an updated Life-Cycle Management review and approval procedure.

First is the new AIS Strategic Planning policy. This policy requires each DoD Component to conduct deliberate planning to increase functional standardization and interoperability of AIS's. Subsequent to the issuance of the AIS Strategic Planning policy, the Deputy Secretary of Defense, in July 1988, directed selected Assistant Secretaries to plan for functional standardization and interoperability among the Components. This direction was intended to maximize the mission benefits to be gained and the cost savings to be accrued from such an effort. The Deputy Secretary of Defense specifically required the Assistant Secretaries to analyze their functional information requirements, to take actions to standardize AIS's to meet prioritized requirements, and to document and coordinate interoperability efforts with the Military Departments and Defense Agencies.

In a period of declining resources, these functional interoperability and standardization actions are intended to maximize the effective use of financial and manpower resources, to avoid false starts emanating from poorly conceived and designed AIS's, and to eliminate overly ambitious performance schedules and underpriced systems. It is anticipated that the implementation of the AIS Strategic Planning policy by the DoD Components and compliance with the Deputy Secretary of Defense's direction on AIS standardization and interoperability will reduce both redundant information in DoD AIS's and the total number of AIS assets dedicated to the support of the same functional information need.

The Department updated its AIS Life-Cycle Management (LCM) policy in June 1988. The policy now requires that no obligations be incurred for AIS acquisition without Milestone approval, which is consistent with the General Provisions of the Appropriation Acts of the past three years. It also clarifies the requirement for the maximum use of Government-owned and commercial products, chartering of program managers, and functional management participation in all LCM phases. The Department has also added two new Milestones, both during the Operations Phase. The first is to ensure periodic assessments of AIS operational effectiveness and suitability. The second Milestone establishes the need and timing for AIS modernization or replacement. When the need is approved, the LCM phases are reinitiated to modernize the existing AIS. This policy is being implemented in each of the Components.

The third policy I wish to describe is AIS Program Baselining. This new policy requires that changes in AIS programs be managed, and that cost growth and schedule slippage for developing AIS's be controlled. The baseline is a formal agreement between functional, resource, and program management officials. It documents their common expectations of intended AIS capabilities, resources, and product delivery schedules. The Baseline Agreement is reviewed by the Major Automated Information System Review Council (MAISRC) when Milestone

approval is sought to develop and to field the system. A breach of the Baseline Agreement automatically triggers notification to the MAISRC.

An updated End User Computing policy was published in March 1989. It provides guidance for managing end user computing, which includes microcomputing and office automation technologies, such that the principles of accountability, life-cycle planning and costing, competition, and appropriate level of management oversight are instituted for the Department. This updated policy also emphasizes cost-effective maintenance planning, as well as providing guidance in areas that are peculiar to end user computing such as use of government-owned computers at off-site locations; computer accommodations for handicapped employees; and electronic record keeping.

Mr. Chairman, we have clarified the description and requirements for the events leading to LCM reviews and Milestone approval, the responsibilities of the review and approval authorities, and the subjects for review at each LCM Milestone or In-Process Review. These LCM review and approval procedures have been updated and are currently being coordinated. The procedures govern the MAISRC, the Department's senior executive level review and approval authority for each major AIS that is not delegated to a Component. The Components are required to use the MAISRC as a model for their own review and approval processes for both delegated major AIS's and nonmajor AIS's.

OSD oversight is not a viable substitute for active Component control of their own AIS programs, so we have developed a consistent framework for the management of AIS programs through these institutionalized policies and procedures. The DoD Components implement and then carry out each of these policies and procedures. When Component implementation is complete and execution is actively underway, the Department will see major improvements in the management of its AIS programs.

The Future Managerial Direction of IRM

Mr. Chairman, in addition to the strengthening actions I have just summarized, the Comptroller issued a major policy statement on the future managerial direction of IRM on May 31, 1988, announcing the development and implementation of an Industry Interface Initiative. The initiative recognizes and responds to major information resources management challenges the Department faces. These challenges are reflected in the following three major objectives:

1. Develop the ability to compete successfully with the private sector in recruiting and retaining information systems professionals, and promote personnel development policies to achieve industry equivalency in the qualifications, experience and expertise of its information systems work force;

2. Become a principal participant in industry's efforts to develop interoperability standards, and become a leader in the adoption and implementation of those standards; and

3. Improve the ability of DoD to access the expertise of industry.

Mr. Chairman, people are the key ingredient to the success of DoD mission accomplishment. We must recruit and retain

strong managers who are information system professionals, who are well-trained, and who are innovative in solving problems. The Comptroller is committed to meeting this challenge as illustrated by two actions we have taken in pursuit of the first Industry Interface Initiative objective. The Department proposed a new Civil Service Information Systems Manager classification series to the Office of Personnel Management (OPM). This was done just prior to the Department's last appearance before this Subcommittee. We are continuing to work with OPM as they consider our proposal.

The second action will fill the void of educational opportunities for managers of DoD AIS's. In a joint action by the DoD Comptroller and the President, National Defense University, the DoD Computer Institute (DoDCI) is being upgraded, reoriented, relocated, and renamed the DoD IRM College. Its charter is being revised and reissued, and the DoDCI has already announced a new curriculum for FY 1990. These actions will provide the opportunity to further enrich the professional skills of DoD AIS program managers and their staffs.

These two actions are intended to improve DoD's ability to compete with the private sector in recruiting and retaining information systems professionals over the long-term. The results of these actions will provide the DoD with more highly qualified information system management professionals and an educational institution that complements the Department's functional information system and AIS policy objectives.

In the area of information processing standards (IPS), I have placed high priority on two efforts to expand and intensify the Department's participation in standards development, and to identify high priority standards needs. To develop AIS interoperability standards, members of my staff became principal DoD representatives and assumed leadership positions in non-governmental standards development organizations in November 1988. These organizations are under the jurisdiction of the American National Standards Institute and the International Standards Organization where the vast majority of interoperability standards are developed.

Last year we began actively working with the Office of Management and Budget, the General Services Administration, and the National Institute of Science and Technology to establish an interagency IPS Strategic Planning Group. The Group, to be formed this Spring, will begin to identify and prioritize information processing standards which are most needed by Government. We in DoD have identified our top IPS priorities requiring early adoption. One includes "Application Portability" standards which will provide interfaces for software languages, operating systems, and data management systems. Another is the "Open Systems Interconnection" standards which will permit standardized communication among different manufacturers' computer systems.

We are now identifying alternative approaches to improve the ability of DoD to access the expertise of industry, the third objective of the initiative. With the goal to reduce overall program and technical risks, these experts would provide short-term assistance to identify, sort, and critically evaluate options leading to key decisions in an AIS program. We have also recommended to the Military Departments that they establish Independent Assistance Groups for use by AIS program managers,

serving in a capacity similar to the Technical Assistance Center. DoDCI has formulated preliminary plans to establish an IRM Technical Assistance Center that would draw on the expertise of the DoDCI staff and outside consultants.

We have high expectations that the Industry Interface Initiative can provide long-term results: in recruiting, retaining, and developing the needed information systems work force; by providing the needed interoperability standards to improve overall operational effectiveness and reduce AIS assets; and by increasing the Department's accessibility to the expertise of industry at key decision points.

Other Significant Resource Management Improvements

Mr. Chairman, I am pleased to report that the Lease Buy-Out Program for ADP equipment, originally sponsored by this Subcommittee, was successfully completed in 1988 having saved two dollars for every one spent and resulting in a net cost-avoidance of $1.1 billion. Also, the DoD ADP Equipment reutilization program produced a DoD-wide cost-avoidance of $27.3 million, and the DoD Automation Resources Sharing Program had a $38.6 million net FY 1988 cost-avoidance. The Department's ADP equipment procurement competition statistics rose from 39 percent in FY 1984 to 78 percent in FY 1988 based on dollars obligated. For office information systems, competitive procurements increased from 18 percent in FY 1983 to 94 percent in FY 1988.

On August 4, 1988 the Department reported to the Subcommittee that the Central Design Activities (CDA's) of the Military Departments appear to be cost-effective and provide quality mission support to their users. To improve management visibility of CDA's, the Subcommittee requested, and Department has submitted, two new budget exhibits on CDA resources and the systems CDA's support.

The DoD Comptroller provided the Department's plan for improving contract maintenance support for general purpose computers on April 28, 1988. The plan also described actions already taken by the Military Departments and Defense Agencies to improve competition in ADPE maintenance contracting, select the most cost-effective maintenance options, improve the monitoring of contract maintenance services performance, and assess the feasibility of further centralization of maintenance contract management within the DoD.

Increased Oversight of Major AIS Programs

Mr. Chairman, this Subcommittee has recognized that one of the most effective aspects of our IRM program is the Life-Cycle Management reviews conducted by the DoD MAISRC. The MAISRC process is very sound. In order to maintain its effectiveness, we continue to evaluate the process to identify additional opportunities for improvement. The following are some recent refinements:

1. As mentioned earlier, our Life-Cycle Management policy and review procedures for the MAISRC have been updated. These updated policies and procedures more specifically define responsibilities, clarify the specific focus of each Milestone review, and identify the key products necessary for a review. These clarifications and refinements more clearly define the expectations and criteria for successful reviews.

2. The focus of program oversight responsibilities in one dedicated directorate of the DoD Comptroller organization has permitted more sustained and focused attention to the issues of program reviews and oversight.

3. In the internal activities that are performed to analyze programs for the MAISRC principals, we have modified the sequence of review steps to force earlier and more focused identification of issues prior to the actual MAISRC review meeting.

4. We have considerably expanded the monitoring of all major AIS's programs, including those for which oversight is delegated to the Components, through the use of a new quarterly reporting process that permits tracking of program costs, schedules and accomplishments. This process makes it possible to independently identify problems and direct corrective action.

As a result of these initiatives, we expect to identify program problems earlier, to make more precise decisions in the MAISRC, to direct the Components to take corrective action immediately to minimize future risks, and to intensify enforcement of DoD policy and Component implementation of that policy.

Conclusion

Mr. Chairman, the Department has made a number of major changes of critical importance to the management of the Department's automated information systems. Among these major changes are the strengthening of the Department's AIS management policies and procedures, the implementation of an Industry Interface Initiative, other significant resource management improvements, and increased oversight of major automated information systems.

The Department's general purpose automated information systems are critical to our national defense supporting nearly every function performed by the Department. The Department continues to work hard to meet the many challenges and opportunities that lie ahead. Mr. Chairman and members of the Subcommittee, I solicit your continued support to carry on the important tasks before us.

FUNCTION OF OSD OVERSIGHT

Mr. MURTHA. The committee understands your office issues Department-wide ADP policies, oversees the $8.9 billion annual ADP budget and reviews the acquisition of major ADP systems which cost in the hundreds of millions or billions of dollars over their life. In short, you are the Department's ADP expert.

Ms. Kendall, what does your office do to manage these resources?

Ms. KENDALL. I support the Comptroller, the Senior Information Resources Management Official for the DOD. I am responsible for all general purpose information technology policy.

Those responsibilities include setting policy, standards and guidelines for information technology and other information resources. One of our prime policies is our life-cycle management policy. This policy establishes an expenditure control process and standard procedure for life-cycle management of automated information systems.

As part of our policy, the OSD reviews large automated information systems within the Department. We use a council, called the Major Automated Information System Review Council, which I chair. We review major automated information systems and approve milestones for those systems.

Mr. MURTHA. Which of the major systems do you review?

Ms. KENDALL. We define major automated information systems as those whose program cost exceeds $100 million, $25 million in any single year, or which we designate as special interest.

Mr. MURTHA. So you don't review systems under $100 million?

Ms. KENDALL. Only in the event we deem them of special interest.

Mr. MURTHA. What are the special programs?

Put that in the record.

[The information follows:]

The following are special interest major AIS programs:
Army Civilian Personnel System (ACPERS);
Standard Installation/Division Personnel System (SIDPERS-III);
Standard Finance System Redesign (STANFIN-R);
TRADOC Decision Support System;
Security Assistance Central Accounting System (SACAS);
DLA Defense Automatic Addressing System Office (DAASO);
Program Budget and Accounting System (PBAS);
Management Information System for International Logistics (MISIL);
Case Management Control System (CMCS);
Contracting Data Management System (CDMS);
Enhanced Transportation Automated Data System (ETADS);
Intersite Gateway (ISG); and
Local On-Line Network System (LONS).

Mr. MURTHA. The committee has discussed at length this year with a number of witnesses the chronic computer problems at Cheyenne Mountain.

We understand that although you are the Department's top computer expert, under your current charter you really don't have much authority over Cheyenne Mountain. Is that accurate?

Ms. KENDALL. Yes.

Mr. MURTHA. Why is that?

Ms. KENDALL. Cheyenne Mountain involves a complex of several integrated systems, including tactical warning/attack assessment.

This complex is large enough and expensive enough that a separate Department of Defense policy for the acquisition of major systems applies.

It also breaks the RDT&E appropriation threshold of $200 million. Therefore, it falls under oversight of the Defense Acquisition Board and is reviewed by that board.

Mr. MURTHA. How does the equipment in Cheyenne Mountain differ from the computer equipment in the Air Force Logistics Command, which you do oversee?

Ms. KENDALL. There are similarities in that much of the equipment, in my understanding, is general-purpose off-the-shelf ADP equipment.

However, Cheyenne Mountain is a large complex system and does involve sensor systems, special purpose hardware and software.

So to some extent the system is different and again, according to our DOD policy, falls under oversight of the Defense Acquisition Board.

Mr. MURTHA. This committee hasn't been too happy with the way they have been running that program. Do you think you could contribute to resolving some of the problems they have out there?

Ms. KENDALL. We believe our life cycle management policy is an effective policy and following those procedures can result in better acquisitions of automated information systems.

Mr. MURTHA. When they have a problem, they don't come to you because it doesn't fall in your responsibility, even though you are the foremost expert in this software field?

Ms. KENDALL. In the past, the Assistant Secretary of Defense asked the MAISRC to review one of the subsystems within the Cheyenne complex, which we did do.

Mr. MURTHA. Which this committee directed?

Ms. KENDALL. I'm not aware of that sir.

Mr. MURTHA. That is one of the few that works out there?

Ms. KENDALL. That is my understanding.

Mr. MURTHA. Mr. McDade?

STANDARD AUTOMATED FINANCIAL SYSTEM (STAFS)

Mr. MCDADE. Thank you very much, Mr. Chairman.

Welcome, Ms. Kendall. We are delighted to have you here and we are delighted to see someone who is going to bring a sense of coherence to all of these programs that are out there. We know it is an enormous job and want to work with you to achieve it.

The committee has been generally well pleased with efforts by the DOD Comptroller to show discipline within this ADP area. A glaring exception appears to be Navy STAFS which started in 1980 as a $33 million system, but which according to the GAO now finds the Navy spending $230 million up from that $33 million with estimates for completion of an additional $479 million for a total of $709 million on a $33 million program.

The committee last year directed the Department to terminate STAFS or get it under control. DOD chose termination because the benefits no longer exceeded the costs. Will you tell us in your judgment what went wrong with that whole process?

Ms. KENDALL. As you stated, the system was originally estimated to cost $33 million and in accordance with our Life-Cycle Management policy, that system fell under the oversight of the Navy.

Also, in accordance with our policy, the DOD Components are required to report to OSD when one of their automated information systems is about to exceed our $100 million threshold.

Mr. MCDADE. One hundred million dollars over cost?

Ms. KENDALL. $100 million program cost, the estimated program cost.

Mr. MCDADE. So if they estimate $33 million and they get up to $100 million, they have to come to you and say, "Whoops."

Ms. KENDALL. That is correct.

Mr. MCDADE. So they came to you and said, "Whoops."

Ms. KENDALL. They came to us in March of 1988 and told us that the program cost was going to exceed the threshold. We started monitoring the system. We called upon them to present the system to our MAISRC. We did follow the system and we scheduled several MAISRC meetings. They were rescheduled as the Navy evaluated alternatives and the Navy eventually decided to terminate the program.

Mr. MCDADE. It looks as though they got up to $230 million before the program was scrapped, so you went beyond the threshold. It required direction from the committee to OSD to say "get into this".

How did the Navy get out to $230 million and why did it require us to bring it to the attention of the Department to get this thing under control?

Ms. KENDALL. My office was made aware of the Navy's exceeding the threshold in March of 1988. We had been following the system, and agree that the Committee's direction did help us in requesting the Navy to bring the system to a MAISRC meeting.

We recognized we had a shortcoming there. We have established a new procedure in which we require the Components to report to us quarterly on their major automated information systems.

Perhaps in the future we can catch this sooner.

Mr. MCDADE. So now if there is a breach of the threshold of $100 million, you now require quarterly meetings from those people; is that the basic change?

Ms. KENDALL. No.

Our basic change is that we require the Components to give us quarterly reports on all their major automated information systems. So, in the future we may be able to catch this type of problem earlier.

Mr. MCDADE. We realize the enormous territory you have to cover. Do you feel comfortable that you have enough resources to be able to get hold of a program that appears to be running amok and gather it in, or do you feel that there ought to be either legislation from over here or some other direction from the committee that would be helpful to you?

We want you to be able to exercise your authority and get into this and recognizing your limited resources, but we want to help you get into it as promptly as possible.

Do you think you need anything more? It is a question that I want to ask you now and if you would like to amplify it for the record, you may.

Do you think there is anything more you need?

Ms. KENDALL. I appreciate the offer.

I believe our Life-Cycle Management policy is strong enough to give us the tools we do need.

We do need to make sure that the Components follow that policy.

[The information follows:]

Mr. Chairman, I appreciate your continued support for our program of work, and thank you for your offer. Based on our current functions and responsibilities, my staff is successfully meeting the current challenges of carrying out our major AIS program oversight responsibilities. However, my current resources may require reassessment if there are significant changes in the scope and level of my functions and responsibilities.

Mr. Chairman, even though my office is adequately staffed, the Department of Defense has had significant problems in recruiting and retaining IRM personnel. DoD has strengthened its policy and oversight of its AIS's, but DoD's ability to improve its AIS programs depends on the DoD employees who manage, acquire, field, maintain, and modernize these AIS's. Yet, DoD does not have a systematic way to identify these crucial employees. This dilutes DoD's ability to target these employees for development of the skills and abilities required to manage complex AIS programs. In short, DoD needs a career program for Information Resources Management and Information Systems Management. Your endorsement of the career program would be beneficial to establishment of programs for the improvement of the AIS work force throughout the DoD.

Mr. MURTHA. Would you yield?

Mr. MCDADE. Sure.

Mr. MURTHA. Are all your billets filled? You have no administrative problems, you have people in all your positions?

Ms. KENDALL. We are currently in the process of filling just a couple of positions, but basically we don't have a problem.

Mr. MURTHA. So you have no shortage of people at all in any of your administrative agencies?

Ms. KENDALL. None other than normal turnover of personnel.

Mr. MCDADE. Put in the record the amount of funding, fiscal years 1987 through 1990, that was requested for STAFS by fiscal year.

How much is obligated, how much is needed for termination and how much is excess.

[The information follows:]

No funds are requested for this project in fiscal year 1990. STAFS was financed through Navy Industrial Fund (NIF) procedures in fiscal years 1987 through 1989. The amounts budgeted and obligated over that period are:

[Millions of dollars]

	Fiscal year—		
	1987	1988	1989
Amended 1989 budget	35.1	24.7	6.8
Obligations	34.8	26.4	[1] 8.1

[1] Obligations from October 1988 through January 1989. The project office was closed and funding discontinued for central operations on March 31, 1989; however, cost data for the months of February and March 1989 are not presently available.

Contract termination is being negotiated with the prime contractor. Consequently, termination costs are not known at this time. There are no excess funds. Actual costs in fiscal years 1989 will exceed budgeted amounts.

WARGAMING ACTIVITIES

Mr. McDADE. In March 1989, the DOD Inspector General published a report on DOD wargaming activities, on which the Department will spend $510 million between fiscal year 1988 to 1992.

Are you familiar with the report?

Ms. KENDALL. My staff has briefed me on that report.

Mr. McDADE. The audit shows that the DOD service schools, colleges, and training centers had expanded or planned to expand wargaming capabilities by purchasing computer systems, developing modeling and data base software, and constructing facilities "without clear objectives."

Who in OSD is responsible for oversight of DOD wargaming activities?

Ms. KENDALL. Basically under the provision of the Goldwater-Nichols Act, the Chairman of the Joint Chiefs of Staff is responsible.

Mr. McDADE. Does he set the priorities?

Ms. KENDALL. The Joint Staff has taken a number of steps. They have established a task force and a council to oversee some of these activities. I don't know, per se, if the task force is going to set priorities, but I would imagine they will look into that type of thing.

Mr. McDADE. We could write them a letter and ask them if they do set the priorities to find out. You know that they go through the process, but who sets the priorities, you can't——

Ms. KENDALL. I can't speak to that.

Mr. McDADE. Do you know who supervises the services to make sure that they share facilities?

Ms. KENDALL. To a certain extent in my role and responsibilities in terms of information technology, we do set policy in that arena.

We put out a memo last summer and are in the process of formalizing that policy. We asked each of the functional proponents at the OSD level to set policies in their functional areas. One of those policies would be in the area of eliminating duplication.

We would also be asking JCS to do that as a functional proponent.

Mr. McDADE. Do you have enough authority to make sure that they are not re-inventing the wheel in 16 places around the town? Do you need assistance to make sure the facilities are compatible and that they can be advantageously used together?

Ms. KENDALL. We would leave that up to the functional proponent to determine that that is the case and then to take action.

Mr. McDADE. If you have somebody in one of the services that has an institutional bias that doesn't want to share a facility with another institutionally biased community, might that not be counterproductive to let the functional person decide what to do?

Ms. KENDALL. Suppose two Services had a logistics system. If the Under Secretary of Defense for Acquisition chose to set a policy that there were certain standards and procedures to be used in the logistics area, he could and should have influence on the Services' sharing.

Mr. McDADE. There is a lot of "could have", "should have" in there. All we are trying to do is to make sure that you have the necessary authorities and capabilities to make sure that there isn't

wasteful duplication. That is all we are after. It sounds easy, we know how difficult that can be.

Ms. KENDALL. We are setting the policy framework to give the ability for those functional proponents to do just that.

Mr. MCDADE. But they make their own decisions as to whether they are or not? Who watches the functional proponent?

Ms. KENDALL. OSD.

Mr. MCDADE. You are at the top of the DOD organization?

Ms. KENDALL. Yes.

Mr. MCDADE. Do you need some kind of bill language or some kind of guidance from Congress? It sounds to me like you think there might be some additional requirements in there that might be helpful.

Ms. KENDALL. I feel that the Department has a policy to eliminate duplication and set standards in their functional areas.

Being that that is our policy, then the functional proponents within OSD have the framework to go forward and have active participation in accomplishing that.

Mr. MCDADE. If you want to amplify your response for the record, you are invited to do so.

[The information follows:]

Mr. Chairman, the Department has recently issued guidance to DoD functional managers, which focused on automated information systems (AIS) interoperability and standardization. The policy statement directed functional managers to take necessary actions to assist the Comptroller in maximizing mission benefits to be gained and cost savings to be accrued. Such actions include: defining and prioritizing functional information requirements to achieve AIS interoperability, taking actions to standardize AIS's to meet prioritized requirements, avoiding duplication and redundancy in AIS's, and reducing the number of AIS's to the absolute minimum to meet mission needs. I believe that when this policy if fully implemented, the Department will have the proper policy framework in place to minimize duplication of automated information systems.

Mr. MCDADE. I am going to quote from the Inspector General's report. He says that "discontinuing certain wargaming activities could save about $62 million."

Were any funds removed from the fiscal year 1990 budget request due to the IG's report?

Ms. KENDALL. I will provide that for the record.

[The information follows:]

Of the $62 million in savings identified by the DoD Inspector General, $40 million relates to a recommendation to discontinue funding for the expension of computer facilities at the Warrior Preparation Center. While the Commander in Chief, U.S. European Command continues to affirm the need for this expansion, $34.1 million was deleted from the Center's budget for fiscal year 1989 through 1992 prior to submission of the fiscal year 1990 budget request. This reduction occurred as a result of management's modifications to the planned expansion. The DoD IG has concluded that this satisfies the intent of the recommendation. The difference in savings represents fiscal year 1988 funding which has already been obligated.

The remaining $22 million relates to a recommendation to discontinue funding the operations of the Joint Warfare Center. Neither the Joint Staff nor the Services concur with this recommendation. Until this issue is resolved, it would be premature to remove funds from the budget.

Mr. MURTHA. Mr. Hefner.

Mr. HEFNER. You are talking about what tools you need. It seems with some of the problems we get into, we invent three or four different systems and spend all this money and then when we find out that they could have shared, it is too late.

We have already spent umpteen billions of dollars. You need to specify that they have to share before we get into the development of them, if that makes sense.

It seems to me when we spend a lot of money and find we have duplication, the horse is already out of the barn.

Does that make sense?

Ms. KENDALL. Yes, sir.

We have a policy that we need to eliminate duplication and set standards where we can.

Mr. HEFNER. You need to eliminate it before it becomes apparent, before you start the program.

Ms. KENDALL. According to our life cycle management policy, we require the Service, in terms of a major system presented to our MAISRC, to evaluate program alternatives. They should be evaluating an alternative of using an existing system in another Service, and we enforce that.

Mr. HEFNER. Thank you.

Mr. MCDADE. Thank you for your testimony. Keep up the good work. We want to work together with you.

Thank you, Mr. Chairman.

Mr. MURTHA. Mr. Hefner do you have any more questions?

JOINT USE OF PAY AND PERSONNEL SYSTEMS

Mr. HEFNER. Thank you, Mr. Chairman.

Let me ask you about pay and personnel systems for the record:

[CLERK'S NOTE.—Questions submitted by Mr. Hefner and the answers thereto follow:]

Question. The Committee zeroed the Army's request last year to begin a $110 million ADP upgrade for its automated military pay system. Subsequently, the Army decided to use the Air Force system rather than invent a new one, and so in conference the Committee restored some funding.

Miss Kendall, why didn't OSD require the Army to use the Air Force system?

Answer. It is OSD policy to maximize use of existing automated information systems to avoid duplication. The Army was delegated oversight responsibility for the Military Pay Redesign program. The Army is responsible for ensuring that DOD policy is appropriately implemented.

Question. The Army now plans to build a unique military personnel system called SIDPERS-3, for which a $42 million contract was awarded last week. Why can't the Army use the Air Force personnel system as well?

Answer. OSD has placed the SIDPERS-3 program on the MAISRC list and plans to conduct a comprehensive review of the program. The review will consider the Army's evaluation of alternative solutions, including the ability of the Air Force system to meet the Army's requirements.

Question. Isn't it true that the Air Force military personnel system automatically "feeds" its military pay system, and in fact both are completely compatible?

Answer. The Air Force's military personnel system does automatically "feed" its military pay system. While the two systems op-

erate on different hardware and at different sites, they are electronically interfaced and appropriate transactions flow between the two systems.

Question. The Navy forecasts a $190 million procurement called PERSPAY—you're right, its an integrated pay and personnel system. Why can't all 3 services share the same system?

Answer. A program's concept development phase addresses potential alternative solutions to the requirements, including the use of existing software. Such software sharing will need to be among the alternatives addressed by the PERSPAY program when it gets to that stage of its life cycle management planning and analysis. However, in general, it is not possible to address the degree of standardization which you suggest strictly from an ADP perspective.

Some of the differences in mission needs and requirements which lead to separate solutions must be addressed functionally. To that end, in July 1988, the Deputy Secretary of Defense requested that several of the Assistant Secretaries of Defense take actions which focus on interoperability and standardization of automated information systems from a functional perspective. These actions are aimed at maximizing the mission benefits to be gained and the cost savings to be accrued.

Question. When will Navy PERSPAY be subjected to a MAISRC?

Answer. PERSPAY Phase II, Milestone 0 (Mission Need Decision) is projected to be submitted and reviewed by the Department of the Navy and the MAISRC in December 1989.

Question. Explain Navy's rationale for slipping this procurement to FY 1994.

Answer. The PERSPAY Phase II acquisition was realigned to FY 1994 due to budget reductions and overall funding constraints within the Navy.

Question. How does the Navy intend to meet its capacity requirements until that time?

Answer. PERSPAY Phase II, as currently envisioned, is essentially the upgrade of existing hardware and software and associated system conversion work. Existing hardware can support PERSPAY Phase I, but will not satisfy Phase II or the Navy Military Integrated Personnel and Pay System (NAVMIPPS) development effort. The current budget for FY 1990 through FY 1993 includes $7.1 million for interim ADP support. The Navy is investigating use of Department of Navy Service Centers to meet computer resource requirements. If capacity is not available in existing centers, the Navy plans to obtain a Delegation of Procurement Authority from the General Services Administration to procure interim equipment with these dollars.

Question. What is the cost of the "stretchout"?

Answer. The "stretchout" costs are estimated at $7.1 million for interim ADP equipment procurement for the period FY 1990 through FY 1993.

Question. What funds are in the FY 1990 budget for PERSPAY and how will they be used?

Answer. The FY 1990 budget contains $1.216 million for PERSPAY.

$260 thousand for personnel to plan and define requirements, and

$956 thousand in purchased services for technical studies supporting the procurement.

Question. What is Navy doing to accomplish full integration of its pay and personnel data bases as required by Congress?

Answer. The Navy is moving towards integration of its pay and personnel data bases through intitiation and implementation of the following systems:

a. The Pay and Personnel Source Data System (SDS) is a standard information system which integrates pay and personnel management at field personnel support detachments. SDS has been developed and is deployed.

b. The Navy Military Integrated Personnel and Pay System (NAVMIPPS) is to provide a shared data base for common data and the standards, procedures and controls to effectively maintain that data for use by all requiring applications. The Navy has established a data base council to identify/define data elements required and principal ownership for each element.

Additionally, the Navy has been directed to review the scope of the PERSPAY program, the requirement for integration, interfacing and interoperability, and to address the full scope of needed improvements, prior to presenting the program for a MAISRC review.

[CLERK'S NOTE.—End of questions submitted by Mr. Hefner.]

PENTAGON AUTOMATION

Mr. HEFNER. This question has to do with the Pentagon Automation.

At our last ADP hearing two years ago, DOD witnesses testified that there was about a billion dollars in computer upgrades going into the Pentagon building alone.

Ms. Kendall, what is the current figure?

Ms. KENDALL. I will have to compile that for the record.

[The information follows:]

Mr. Chairman, the budget estimate for Pentagon Automation for the Army, Navy, Air Force, the Joint Staff, and OSD for both FY 1990 and FY 1991 is $452.3 million. This amount is based on the "Reagan Budget." A breakout of this budget estimate for both fiscal years, by Headquarters Component, is:

Fiscal years 1990 and 1991

[In millions of dollars]

Army	$116.1
Navy	40.5
Air Force	100.3
Joint Staff	19.3
OSD	176.1
Total	452.3

Mr. HEFNER. What has OSD done to force the services to coordinate their plans and to share equipment? Answer that for the record please.

[CLERK'S NOTE.—The Department was unable to provide a response in time to be printed in this hearing volume.]

Mr. HEFNER. Would you just mention what you have done to force the services to coordinate their plans to share equipment—

what does OSD do to prioritize and curb the appetite for equipment, ensuring that only the most urgent requests are satisfied?

Ms. KENDALL. Every year when the budget is submitted to OSD, it is reviewed and requirements are reviewed, to see that they are sufficiently justified to support the mission needs and functions.

Mr. HEFNER. Who in OSD is responsible for Pentagon automation?

Ms. KENDALL. In my role and responsibility for all automated information technology, I carry that responsibility. That includes Pentagon automation.

However, each Service has established a senior official responsible for reviewing and approving their automation plans and programs.

Mr. MURTHA. How many people are we getting rid of with this automation? Automation implies we are getting rid of a lot of people in the Pentagon. There are probably a lot of vacant offices there, aren't there?

Ms. KENDALL. Not that I am aware of.

Mr. HEFNER. You have to have somebody to make the decisions to automate. The Army tells us that they plan to spend $67 million in fiscal year 1990 and 1991 for headquarters automation, yet they just proposed taking $140 million out of the reserve component automation systems, which is essentially our nation's ability to mobilize the Army within the required time frame, due to the lack of funds. Do you believe that the Army and the Pentagon have more urgent computer requirements than reserve soldiers who have hardly any computer capability?

Ms. KENDALL. I recognize the priority afforded the RCAS system. However, I am not aware of the processes that the Army went through in evaluating their critical or urgent needs for headquarters' automation.

Mr. HEFNER. Will you be made aware of that sometime in the future?

Ms. KENDALL. To assess whether the Army's automation requirement is more important than RCAS?

Mr. HEFNER. Yes.

Ms. KENDALL. The RCAS is fully funded in 1990—the numbers you saw as being removed from RCAS are actually in the outyears. We are dependent on the Army to assess and prioritize their programs internally.

Mr. HEFNER. Going back to Mr. McDade's questions earlier and my questions, do you feel that you are making some progress and that you have the tools that you need with the lean budget that we will be operating with, that you are going to be able to sniff out this duplication? Do you feel you are making strides, that you have the support that you need to prevent duplication?

Ms. KENDALL. I do.

Mr. HEFNER. Do you feel you are going to be able to do a better job in the next two years than we have done in the past two years?

Ms. KENDALL. I believe the Department is making strides. We are involved in standards committees, in the international and national arenas, and I think that, in the long term, this will help us reap some benefits in the automation area.

Mr. HEFNER. Do you think that the services have realized with the tight budgets that we have that they are going to have to cooperate better and weed out some of the duplications and share in the scarce resources that we have in this particular area?

Ms. KENDALL. I think we will continue to espouse that goal and that people generally share that goal.

Mr. HEFNER. Thank you. Thank you, Mr. Chairman.

Mr. MURTHA. Mr. AuCoin?

RESERVE COMPONENT AUTOMATION SYSTEM (RCAS)

Mr. AUCOIN. Thank you, Mr. Chairman.

Mr. Chairman, I am sorry I wasn't here for the beginning of the hearing. Have questions been asked about computers for the Army reserves at this point? I would like to get into that, if I may.

Ms. Kendall, the committee has been struggling with the Army for a number of years to field a fundamental computer capability to the reserves so that they can mobilize effectively during wartime.

What is the status of the Reserve Component Automation System or RCAS?

Ms. KENDALL. There has been significant progress being made in this program.

Mr. AUCOIN. Significant progress?

Ms. KENDALL. Yes. I will expand upon that.

The program has been proceeding and meeting congressional direction from the Fiscal Year 1988 Appropriations Act.

Draft functional descriptions have been completed and distributed for comments and are expected to be completed this June.

A definition of the critical elements has been conceptually agreed upon, and currently the Army is scheduling a MAISRC milestone meeting for this September. They plan to release an RFP in the first quarter of Fiscal Year 1990.

Mr. AUCOIN. General Temple is program manager for this; is that right?

Ms. KENDALL. Yes.

Mr. AUCOIN. He has indicated that he will or can—can and will—field critical elements of the system in fiscal year 1992.

Is that the Department's plan?

Ms. KENDALL. Provided the system meets our planning and program management requirements, and is consistent with our life-cycle management policy; yes, it is.

Mr. AUCOIN. Who will make that determination?

Ms. KENDALL. We require systems to be brought to the DOD MAISRC, at which time we review the program, approve a major milestone, or tell them to go back and review their planning. I am the chair of the MAISRC.

Mr. AUCOIN. We understand that OSD eliminated most of General Temple's fiscal year 1991 RCAS funding during internal budget deliberations.

Most of the members of the committee feel that those funds are critical for the competitive "compute off" which must be accomplished on time in order to achieve the planned fielding date.

Why did OSD take this action and how is it going to be rectified?

Ms. KENDALL. RCAS is fully funded for 1989 and 1990. We recognize that there is a scheduled need for funding in 1991 for this compute off. OSD is prepared to entertain a reprogramming action for this in the event we are not able to make an adjustment before the Fiscal Year 1991 appropriations.

Once we hold our milestone review this coming September, we will have a better idea of the funds needed for 1991.

Mr. AUCOIN. RCAS is fully funded for fiscal year 1990?

Ms. KENDALL. That is correct.

Mr. AUCOIN. General Temple's requirement is $575.3 million. The Reagan budget recommended or proposed instead of $575.3 million, $359.9 million, and then the Bush revisions have brought that down to $218.9 million.

So the way I read it, since RCAS, as now presented to Congress, is only 38 percent funded, there is a question in my mind as to how serious the Department is about the program.

Ms. KENDALL. The Department has——

Mr. AUCOIN. How can you call it fully funded?

Ms. KENDALL. The Department has approved the mission need statements for the RCAS.

Mr. AUCOIN. Just not the money for it, though.

Ms. KENDALL. Well, we do have full funding for 1989 and 1990.

Mr. AUCOIN. I am reading 1990 budget numbers. My understanding is that General Temple's requirement is $575.3 million.

Ms. KENDALL. That would be program cost.

Mr. AUCOIN. So you are saying that fiscal year 1990's segment of that is fully funded?

Ms. KENDALL. That is correct.

Mr. AUCOIN. What are you saying about fiscal year 1991?

Ms. KENDALL. 1991 and on out, we recognize is underfunded at this time in our FYDP. We need another economic analysis. The existing economic analysis does not represent the changes directed by Congress, nor does it represent the new functional description that the program manager has just recently sent out for comment.

The Army will be doing an economic analysis on this program and presenting it to the MAISRC in September. At that time, we will have more definitive program costs for the RCAS program.

The Army has told me that they recognize they have a responsibility for addressing the funding problem.

Mr. AUCOIN. In a March 1989 memorandum to Deputy Secretary Taft, the Assistant Secretary of Defense for Reserve Affairs unsuccessfully argued against the active Army's $140 million reduction to RCAS under the Bush budget amendment.

He said, "I am greatly concerned that the Army appears to be using this program as a bank account."

Those were his words. Do you agree with that?

Ms. KENDALL. The Army has only expressed their support of RCAS to me and their intent to address the funding issue once program costs are estimated again this summer.

Mr. AUCOIN. Congress requires by law a pure competitive A-109 approach with no restrictions or conditions attached to this acquisition in order to maximize competition.

Does the Defense Department plan to fully comply with that law?

Ms. KENDALL. Absolutely. The program manager is planning an A-109 with no GFE.

Mr. AUCOIN. Do you plan an A-109 or a modified A-109?

Ms. KENDALL. We are planning an A-109 with full and open competition based on the functional description that is currently in the process of being finalized. The vendors are going to be free to propose system concepts and there will be a competitive demonstration.

The RCAS A-109 acquisition will not allow GFE.

Mr. AUCOIN. Will it be modified in any other way?

Ms. KENDALL. Not that I am aware of. We intend to fully comply with the congressional direction.

Mr. AUCOIN. Thank you.

Thank you, Mr. Chairman.

Mr. MURTHA. We appreciate you coming. The Army has some real problems. Therefore, we appreciate you being so frank and doing such a good job, Ms. Kendall, in appearing before the committee.

If there are no other questions, the Committee will adjourn. We will have other questions for the record.

Thank you very much.

[CLERK'S NOTE.—Questions submitted for the record and the answers thereto follow:]

WARGAMING ACTIVITIES

Question. In March 1989 the DOD Inspector General published a report on DOD wargaming activities, on which the Department will spend $510 million between fiscal year 1988 to 1992. The IG reported:

> Because OSD and the Joint Staff lacked policies and guidance on wargaming activities, the Navy's SPAWAR, Air Force Wargaming Center, and the Joint Warfare Center had programmed $116 million for expansions of joint wargaming capabilities without coordinating those activities with the other Services. The expansion of capabilities at schools was unwarranted because they assumed that war plans were releasable to them, but JCS policy precludes the schools' use of war plans. Also, the wargaming activities at certain centers duplicated those of other DoD components.

What action will OSD take to clean up this situation?

Answer. The Department has a policy on automated information system (AIS) standardization and interoperability that requires functional proponents to take action to avoid duplication and redundancy between AISs. This policy provides a framework for identifying and eliminating duplication, if it exists.

The Joint Chiefs of Staff (JCS) are responsible for wargaming policy. JCS has established the DoD-wide Joint Modeling and Wargaming Executive Council (JMWEC) to oversee and coodinate the development of modeling and wargaming in DoD. The JMWEC is composed of representatives from OSD, the Joint Staff, Defense Agencies, the Services, and the unified and specified commands. A comprehensive wargaming and simulation policy for joint training and education is being developed under the JMWEC's aegis. A subordinate working group will concentrate on the use of wargaming and modeling in joint training and education.

Question. For the record, provide:

All funds by appropriation, fiscal year, and line item in the DoD budget for wargaming in each fiscal year 1988 to 1994.

Breakout the IG's $62 million in the same format.

Answer. Funding in the DoD budget for wargaming activities, associated with education and training, is as follows:

[In millions of dollars]

Appropriation	Fiscal year—						
	1988	1989	1990	1991	1992	1993	1994
Other procurement: [1]							
Army	6.6	4.1	4.5	0	0	26.3	0
Navy	0	0	2.3	0	0	0	0
Air Force	4.2	0.5	0	0	0.9	0.9	1.0
Total	10.8	4.6	6.8	0	0.9	27.2	1.0
Operation and maintenance:							
Army	2.0	3.5	13.8	24.3	24.1	25.7	25.6
Navy	4.4	4.5	4.1	4.2	4.2	4.4	4.5
Air Force	13.9	11.1	10.6	7.6	10.3	10.8	11.4
Total	20.3	19.1	28.5	36.1	38.6	40.9	41.5
RDT&E: [2]							
Army	8.3	6.2	1.4	4.7	10.2	7.2	6.9
Navy	3.1	2.1	2.1	2.1	2.3	2.3	2.4
Total	11.4	8.3	3.5	6.8	12.5	9.5	9.3
Grand total	42.5	32.0	38.8	42.9	52.0	77.6	51.8

[1] Detail by line item within the Other Procurement appropriation is: Army—Budget Activity 3; P–1 line—Nonsystem training devices. Navy—Budget Activity 7; P–1 line—Computer Acquisition Program. Air Force—the budget revision deleted $300 thousand of Other Procurement funds requested in the Reagan Budget for FY 1990 and FY 1991.

[2] Detail by line item within the RDT&E appropriation is: Army—Budget Activity 4; Program element—0604715A. Navy—Budget Activity 4; Program element—0204571N.

The amounts reported for the Air Force in fiscal year 1988 are budget estimates. Revised cost data, reflecting the results of execution, could not be obtained in time for this response. It is estimated, however, that the actual level of effort was lower than the budget, more in line with the amounts shown in fiscal year 1989 and out.

Of the $62 million in savings identified by the DOD IG, $40 million relates to a recommendation to discontinue funding for the expansion of computer facilities at the Warrior Preparation Center. While the Commander in Chief, U.S. European Command continues to affirm the need for this expansion, $34.1 million was deleted from the Center's budget for fiscal year 1989 through 1992 prior to submission of the fiscal year 1990 budget request. This reduction occurred as a result of management's modifications to the planned expansion. The DOD IG has concluded that this satisfies the intent of the recommendation. The difference in savings represents fiscal year 1988 funding which has already been obligated.

The remaining $22 million relates to a recommendation to discontinue funding the operations of the Joint Warfare Center. (This represents the cost of operations during fiscal year 1988 through 1992.) Neither the Joint Staff nor the Services concur with this recommendation. The following amounts are included in the DOD budget for Center operations:

[In millions of dollars]

Appropriation	Fiscal year—						
	1988	1989	1990	1991	1992	1993	1994
Other procurement: [1]							
Army	2.4	0	1.0	0	0	0	0
Air Force	0	0.3	0	0	0	0	0
Total	2.4	0.3	1.0	0	0	0	0
Operation and maintenance:							
Army	0	1.1	1.0	1.8	1.8	1.8	1.8
Air Force	[2]0	5.8	3.5	0.3	2.7	2.7	2.9
Total	0	6.9	4.5	2.1	4.5	4.5	4.7
Grand total	2.4	7.2	5.5	2.1	4.5	4.5	4.7

[1] Detail by line item within the Other Procurement appropriation is: Army—Budget Activity 3; P–1 line—Nonsystem training devices.
[2] The Center's O&M costs in fiscal year 1988 were financed by the Operation and Maintenance, Air Force appropriation. Actual cost data for the Center in that fiscal year, however, are not readily available as they were merged with the cost of other wargaming activities.

COMPUTERS TO ACCOUNT FOR FOREIGN MILITARY SALES

Question. In the late 1970's, the Committee often reduced DOD O&M accounts because they were unfairly subsidizing foreign military sales since the Defense Department could not properly perform the FMS accounting. The answer we were told would be "the new computer system." In July 1988 the Deputy Secretary of Defense terminated the development of the computer system after spending $119 million of non-appropriated FMS surcharge funds through FY 1989.

What were we trying to accomplish over the last ten years with the computer system?

Answer. We were implementing a combination of computer systems and capabilties to ensure that we could: improve cash control; reduce the large unreconciled cash differences; and establish a compliant system.

The FFMIP was established to rectify these deficiencies. The program consisted of three elements:

A centralized FMS accounting system, the FMS Accounting and Billing System (FABS), which is the only portion that was terminated.

A communication system, the FMS Integrated Control System (FICS), which provides a standard, controlled data flow between the Military Departments (MILDEP).

MILDEP improvements to their existing systems.

Question. Why did the Deputy Secretary terminate it?

Answer. The Deputy Secretary of Defense terminated only the FABS portion of the FFMIP which accounted for $25 million of the non-appropriated FMS surcharge funds. It was terminated because of a number of serious technical and managerial problems that were continuing without a clear resolution.

Question. DOD's Director for Operational Testing reported to the Committee that "an on-site review of the FFMIP revealed the design to be deficient in all areas with only 12 per cent of the software completed." This is what we got for $119 million?

Why didn't your process catch this before it became such an obvious disaster?

Answer. The $119 million that you refer to is the total cost of all three elements of the FFMIP. The Director's statement refers only to the terminated FABS effort which represents only $25 million of the $119 million. The remaining two components have been implemented and have helped rectify important FMS deficiencies.

The oversight process did identify the problems in 1987 and initiated actions to rectify the problems. Only after those avenues did not yield positive results, was the program canceled in 1988.

Question. What are we going to do now?

Answer. Actions are underway to develop a new system called the Security Assistance Central Accounting System.

Question. How serious of a problem do we have?

Answer. With the enhancements made to the existing system over the past year, the seriousness of the problem has diminished in the areas of cash control and reconciliation.

Question. Apparently another "new computer system" is the answer (again). How will the problem be fixed?

Answer. We have strengthened program controls for the new centralized system and transferred responsibility for central FMS accounting to the Air Force.

Question. Who is responsible for the new system?

Answer. The Air Force is the Executive Agent and is fully responsible.

Question. What management changes are envisioned for the new system in order to avoid the failure of the previous system?

Answer. We have taken many steps to strengthen program control to include using the Air Force, as the Executive Agent and ensuring that life-cycle management discipline is closely followed. The Air Force progress will be closely monitored by the MAISRC through oversight reviews, staff on-site reviews, and evaluation of the quarterly progress reports.

ARMY STANDARDS

Question. In April, 1987 Deputy Secretary of Defense Taft wrote to the Secretary of the Army:

"Three times in the past year it has been necessary to write the Army regarding OSD concerns that the information Mission Area standards and related implementation were unclear and could unduly limit competition. Both industry and the Congress have now also criticized the application of these procurements. Therefore, to prevent continuing confusion and avoid potential violations of Federal regulations, you must immediately withdraw these standards from use."

Did your office write the Taft memorandum?

Answer. Yes, my office prepared the package that was recommended for Mr. Taft's signature.

Question. Has your office yet approved new Army standards?

Answer. No, my office has not yet seen the new Army standards.

Question. If not, under what assumptions has the Army's $2.5 billion annual ADP program been operating under the past two years?

Answer. The Army's ADP program has been justified on the basis of mission needs and program requirements, and not on the basis of specific standards.

Question. The Committee directed your office to conduct "architecture reviews" of the Service's ADP programs in order to prevent problems like this. As you are aware, Navy has recently been accused of having an IBM preference similar to the Army's problem above. Have you ever conducted an "architecture" review?

Answer. In 1988, the Comptroller directed the Services to present their strategic automated information system planning for review. Each Service briefed the Comptroller and staff on this subject. The Comptroller and his staff reviewed strategic planning, architectures, and budgeted programs to assess the Services' progress in implementing AIS strategic planning policy and in conducting strategic planning. Further, the Comptroller assessed the technical architectures of the Components to ensure consistency with direction established in the respective strategic plans, and that they conformed with applicable law, regulations, and policies regarding AIS acquisition and information processing standards. The Comptroller also ensured that the Service priorities and funded programs were supportive of and consistent with the strategic plans and architectures.

Question. What plans do you have to comply with the Committee's direction in this regard?

Answer. During the reviews of Component AIS strategic plans, we will continue review Component information architectures. During the reviews of each major AIS program, we will be ensuring that program plans are supportive of and consistent with Component strategic plans, architectures, and information processing standards.

INFORMATION RESOURCES MANAGEMENT COLLEGE

Question. In November 1988 the DOD Comptroller issued a memorandum on the DOD Computer Institute and said that it would be "upgraded, reoriented, relocated, and renamed."

Miss Kendall, it sounds like the Department did some major "housecleaning." Please describe the new goals for this organization.

Answer. The DOD Computer Institute is being upgraded to become the National Defense University Information Resources Management College. The principal goals of the Information Resources Management College will be to provide education, training, and technical assistance to DOD AIS Program Managers and their staffs. Also included will be others who are involved in the design, development, fielding, operation, and maintenance of DOD AIS's and who are involved in the planning, funding, and control of AIS programs. The IRM College will be concerned primarily with AIS's and with providing AIS-related courses that are critically needed and that are not otherwise available.

Question. How will this result in better ADP acquisitions?

Answer. By improving the knowledge and skills of DOD AIS program managers and their staffs, it is expected that ADP acquisitions will improve in terms of adherence to schedule, maintaining

cost control, and proper management and oversight controls. Several of the new courses in development for the IRM College curriculum relate directly to decisions affecting AIS development and acquisitions. Among these are courses on AIS Acquisition and Cost Control, AIS Functional Requirements and Concepts Development, AIS Security, and Decision Support Systems.

Question. What is the annual investment to operate this facility?

Answer. DODCI/IRMC funding for FY 1988 through FY 1991, shown in millions, is as follows:

[In millions of dollars]

Appropriation	Fiscal year—			
	1988	1989	1990	1991
Operations and maintenance	.5	1.2	2.7	2.7
Procurement			0.2	
Total	.5	1.2	2.9	2.7

The FY 1988 funding represents the annual costs of operating the DoD Computer Institute as a largely introductory, technical school, with about 21 faculty and staff members, average grade GS–12. FY 1989 funding reflects, the beginning of transition to the IRM College. Funding for FY 1990 and beyond supports an advanced professional IRM curriculum, with 39 faculty and staff, average grade GS–14. Compared to the amount of DOD funds expended on automated information systems, this is a small investment for education and training.

Question. Explain the concept of the "Technical Assistance Center" which is to be run by this organization.

Answer. The concept of the IRM Technical Assistance Center is based on the need to support AIS Program Managers and their staffs through a total range of support services from student to practitioner. The Technical Assistance Center will provide topical, intensive assistance as needed by individual Service, program manager, or issue. The precedent for and success of such technical assistance programs is well established in the computer industry, where the business community is the recipient of technical assistance and knowledge transfer from the academic community. The Center will draw on the expertise of the IRM College faculty, as well as other available resources, to provide specific assistance on DOD AIS programs and issues.

INDUSTRY INTERFACE INITIATIVE

Question. In May 1988 the DOD Comptroller established an Industry Interface Initiative.

Please explain the goals of this initiative.

Answer. The goals of the Industry Interface Initiative are threefold:

(1) To provide DOD with the ability to compete successfully with the private sector in recruiting and retaining information systems professionals.

(2) To evolve DOD as a principal participant in the industry's efforts to develop interoperability standards, and establish DOD as a leader in the adoption and implementation of those standards.

(3) To improve DOD's ability to access the expertise of the industry and increase the use of industry expertise in the concepts development, design, and system development of new automated information systems and existing automated information system modernizations.

Question. How can DOD compete with industry for personnel who have unique training and other skills in the highly technical ADP field?

Answer. DOD already offers a wide vareity of challenging information technology jobs. DOD is having recruiting problems and must find ways to recruit and hire the best qualified applicants. For DOD to compete with industry for highly skilled information technology personnel, we need an entry level which is competitive dollarwise. For retention, we need an appropriate job series, with career patterns offering enrichment, personal growth, and potential for advancement.

Question. How will DOD participate in the development of interoperability standards, so that different vendors' equipment can be linked together for use within the Department?

Answer. DOD participates in the development of interoperability standards by contributing to the standards development work of national and international standards committees under the auspices of American National Standards Institute [ANSI] and the International Standards Organization [ISO]. Standards will produce long-range benefits. Indeed, it may be 5 to 10 years before substantial benefits are derived from this initiative.

Question. We understand that you have had some resistance from the Office of Personnel Management relating to certain personnel actions. Please describe your requirements and what the roadblock with OPM is.

Answer. In February 1987, DOD forwarded to OPM a proposal for an information systems manager job series and classification standard. Also, GSA in September 1987 issued a report on information systems personnel issues, which endorsed the DOD proposal. OPM conducted factfinding studies on the series and found diversity among DOD and non-DOD agencies as to applicability of the proposed standard. OPM acknowledged that an occupational area may be evolving, but they have not yet approved the proposal as a government-wide standard.

DOD needs to be able to recruit and retain skilled, professional information systems managers. DOD is moving ahead to provide educational and developmental opportunities for AIS program managers and their staffs, but a distinctive job series and classification is needed to provide cohesion, rather than diversity, in information system career patterns.

PROBLEM WITH THE LIBRARY OF CONGRESS

Question. In March 1989 the Librarian of Congress informed our Subcommittee on the Legislative Branch of a problem discovered by the Library's Inspector General. He reported:

"Certain agencies were using the FEDLINK program to contract for services without competition—services that were not within the FEDLINK program"

"The contracting abuse appears to be centered in Department of Defense agencies and includes all branches of the services, including field units."

"None of the questionable contracts reviewed have any relationship to libraries or library business."

"They are for military related studies and projects and/or computer system design, purchase/lease, and/or training."

Miss Kendall, are you aware of this problem?

Answer. Yes, I am.

Question. What action is being taken by the DOD Inspector General?

Answer. The DOD Inspector General started an audit of contracting through interagency agreements with the Library of Congress in February 1989. This audit was started in response to information provided by the General Counsel and Inspector General of the Library of Congress of possible improprieties relating to DOD's use of the Library's FEDLINK procurement program.

The objectives of the audit are to evaluate the practice by several DOD activities of providing funding to the Library of Congress for the purpose of contracting for services and supplies, and to evaluate the adequacy of DOD internal control procedures for monitoring these contracting activities. The audit is nearing completion. A draft audit report on the results is tentatively scheduled for issuance in August 1989.

Question. Are DOD activities contracting with the Library of Congress for routine computer services simply to avoid competition and to shortcut the acquisition process?

Answer. Answer of this question is contingent on completion of the DOD Inspector General's audit.

Question. Why are DOD policies not effective at prohibiting abusive contracting arrangements such as this?

Answer. The DOD Inspector General is reviewing the DOD internal control procedures involved in monitoring these contracting arrangements. The completed audit will give insight as to ways DOD can be more effective in averting future contracting improprieties.

Question. The Librarian of Congress identified $47 million of questionable FY 88 DOD obligations under this arrangement "with a view toward termination." How much was removed from DOD's FY 90 budget as a result of elimination of these questionable items?

Answer. As yet, DOD has not made budget adjustments based on the issues identified by the Librarian of Congress. The Department is expected to terminate contracts improperly using FEDLINK as a contracting vehicle. Although a contract is terminated, the requirement for a service or product would still exist. There would likely be no need to reduce the budget. Proper contracting arrangements would be necessary to meet the requirement.

Question. For the record, provide a breakout by appropriation and fiscal year for the $47 million identified in the Librarian's March 7, 1989 letter to Chairman Fazio. Indicate the value of FY 1989 and 1990 contract options for those contracts that had options.

Answer. The Library of Congress has identified participation in FEDLINK contracts by about 735 separate DOD activities, each with its own individual interagency agreement. Most of these agreements have been properly used for Library support. The total value of all the interagency agreements is about $83 million. A breakout of the $47 million requires completion of the audits and reviews underway by the Library of Congress and the DOD Inspector General.

ARMY SIDPERS–3 SYSTEM

Question. For the last 3 years the Appropriations Committees have had a general provision in law stating:

"None of the funds appropriated or made available by this Act may be obligated for acquisition of major automated information systems which have not successfully completed oversight reviews required by Defense Department regulations."

Miss Kendall, are you familiar with our general provision?

Answer. Yes, I am.

Question. Is an Army ADP program to upgrade its personnel system called SIDPERS–3 (Standard Installation/Division Personnel System) on the OSD list of systems requiring review by OSD's Major Automated Information System Review Council?

Answer. Yes, it is.

Question. The Army contracted with a local "beltway bandit" to perform the economic analysis for SIDPERS–3 that is required by DOD regulations. That company briefed the Committee staff on Monday that the SIDPERS–3 life cycle is $1.9 billion. Would a $1.9 billion ADP initiative require formal MAISRC review?

Answer. The criteria for MAISRC reviews is not based upon life cycle cost, but rather upon program cost. Program cost is the cost of acquisition, development and deployment. Program cost plus the operations and maintenance costs equals life cycle cost. However, one would expect an AIS with a $1.9 billion life-cycle cost to meet the MAISRC review criteria of $100 million total program cost or $25 million program cost in a single year. SIDPERS–3 has been added to the list of systems which receive formal review by the MAISRC.

Question. Last week the Army awarded a $42 million contract for SIDPERS–3 last week. In light of the law, isn't this illegal?

Answer. I have designated SIDPERS–3 as a major automated information system and the MAISRC will conduct a review of this program in the near future. Initial information has been requested to assist in structuring a preliminary assessment of SIDPERS–3 compliance with oversight and life-cycle management policies. This information will be used to determine the focus and schedule for the MAISRC review. The DOD Comptroller has also directed the Army to limit obligations on this program to the minimum necessary to protect the government's investment in the program, pending determination of the facts, a review by the MAISRC and selection of the most appropriate course of action.

Question. What action does OSD plan to take to limit obligations and expenditures on this contract to conform to the law until the requirements of DOD regulations have been met?

Answer. On June 30, 1989, the Comptroller directed the Army to minimize obligations for SIDPERS-3 until the Department can ascertain the facts of this program and determine through a MAISRC review what other actions, if any, are required.

Question. GAO tells us about potential duplication between this system and RCAS, stating "no matter how the problem of duplication is solved eventually, there appears to be a lack of understanding and coordination between the SIDPERS and RCAS staff which works to the disadvantage of both systems." What action will OSD take to ensure no duplication between these billion dollar systems?

Answer. The MAISRC review will address the issue of functional duplication and coordination between the two programs.

Question. For the record provide the SIDPERS-3 life cycle cost.

Answer. It is important to note that the following resource estimates come from economic analyses that have not yet been validated by either the MAISRC or the Army. The SIDPERS-3 life-cycle cost estimate (LCCE) from the 1987 Economic Analysis is $1.649 billion in constant FY 1987 dollars over 8 years. The 1989 Economic Analysis LCCE is $1.955 billion in constant FY 1989 dollars over 12 years.

Question. For the record provide the SIDPERS-3 investment cost by category (hardware, software, operations, etc.).

Answer. SIDPERS-3 investment costs [1] are:

	Millions
ADPE/Comm. purchase	$124.7
Site preparation	.5
Software development/modification	96.0
Software conversion	4.7
Software procurement	2.2
Training	1.0
Other one time costs	13.3
Total	242.4

[1] Source. 1987 economic analysis which covered FY86-93.

Question: For the record provide a summary of the economic analysis used by the Army to support its Army MAISRC decision to proceed with SIDPERS-3.

Answer. Summary of the 1987 economic analysis:

	Millions
Investment costs	$242.4
Software maintenance	446.8
Communications	43.4
Hardware upgrade and maintenance	266.4
Operations (personnel)	650.7
Total	1,649.4

Question. For the record provide a summary of the economic analysis prepared under contract by AMS.

Answer. A summary of the 1989 economic analysis is:

	Million
Investment cost	$149.7
Software	422.1
Communications	16.5
Operations, hardware upgrades and maintenance	1,084.0
Functional user salaries and training	282.8
Total	1,955.0

Question. For the record provide an explanation of the difference between the previous 2 questions.

Answer. The differences are explained by:

1. The 1987 economic analysis covered 8 years (FY 1986–1993); the 1989 economic analysis covers 12 years (FY 1989–2000).

2. The 1987 economic analysis cost 3 years of operations; the 1989 has 8 years of operations.

3. The two analyses use different base-year dollars.

ARMY VIABLE SYSTEM

Question. The Army has $1.2 billion ten year contract to operate five regional data processing centers for 47 Army bases in a contract called VIABLE. In April 1988 the Committee Investigative Staff reported on Army plans to use unexecuted equipment options on the VIABLE contract to upgrade computers not part of the VIABLE system.

Has the Army requested authority from OSD to upgrade "Tier 2 processors" at Army bases with unexecuted contract options from the VIABLE contract?

Answer. The ASIMS (VIABLE) contractor developed "A White Paper for the Consolidation and Modernization of U.S. Army Data Processing Assets at the Tier II Installations." The issue of upgrading "Tier 2 processors" comes from that paper. It is our understanding that the Army did not request the paper/proposal and does not intend to implement the recommendations found in that paper. To our knowledge the proposal was not formally sent to the Army. The Army has not requested authority to upgrade "Tier 2 processors."

Question. The contractor tells us that the cost of this initiative would be between $40 and $80 million. Presumably ultimate costs would be higher when personnel, software, and O&M are considered. Do you consider this to be a major initiative?

Answer. The Army indicates that it has no requirement to upgrade Tier 2 processors with ASIMS (VIABLE) equipment.

Question. Is this initiative visible in the budget to Congress?

Answer. The Army indicates that they do not intend to take action in the initiative and therefore no resources are included.

Question. The investigative staff reports that the Army had 14 meetings with the contractor. If the Army truly has a requirement to upgrade such equipment, why can't it do so competitively?

Answer. The Army indicates that there is no requirement to upgrade the equipment. Any Army meetings with the contractor would be related to the current contract services, not something outside the confines of the VIABLE, or other Army contract. Such meetings are intended to keep senior officials of both the Army and contractor familiar with the status of the current efforts and to avoid misunderstandings that result from indirect communications.

Question. Wouldn't discussions with all vendors be appropriate?

Answer. The Army indicates it does not intend to upgrade the equipment and discussions with any vendors on the issue would be inappropriate.

Question. In an April 11, 1989 fact sheet to the Committee the Army informed us that "If the EDS proposal is determined to be

cost and operationally effective, then it will be implemented." Is this your view?

Answer. This action is not related to the EDS white paper upgrade to Tier II processors. The Army indicates that the action referrred to in the April 11, 1989 fact sheet was for use in gaining information as to the technical feasibility of eliminating the ASIMS remote job entry equipment by connecting the existing installation processors into the ASIMS net. The Army has indicated that this will not be implemented on the EDS contract but will be used to provide technical insight into the fully competitive A-109 vendor proposals for the replacement ASIMS system.

Question. Isn't it true that this acquisition would conform exactly to the standards that the Deputy Secretary of Defense directed the Army to withdraw in April 1987 because they were anti-competitive?

Answer. The issue of standards does not appear relevant since the Army has indicated that it has no requirement for such an acquisition and does not plan any such action.

COMPOSITE HEALTH CARE SYSTEM.

Question. The Department of Defense is well underway with a tri-service ADP program to automate its hospitals and medical facilities. This acquisition is thought to be a "model" ADP procurement.

What is the status of the Composite Health Care System (CHCS)?

Answer. CHCS received a Milestone II approval from the Major Automated Information System Review Council (MAISRC) in March 1988. In preparation for the full scale operational test and evaluation activities, CHCS is now installed and operating at 10 test sites. Installation is underway at four other sites. Other preparations for operational test activity are underway, and a deployment decision is currently projected for August 1990.

Question. Congress placed a $1.1 billion constant dollar cost cap on this program, similar to what was done on the B-1 bomber. Has this been effective in restraining costs?

Answer. The program cost cap has contributed to effective restraint of costs during the acquisition and development process.

Question. This program is managed by the Assistant Secretary of Defense for Health Affairs. Last year, the Committee directed that management and funding for deployment of CHCS remain centrally controlled by OSD. Did the Department fully comply with our direction?

Answer. The Department has partially complied with the direction. As part of the budget review cycle last year, the Department decentralized funding for the deployment and operation of CHCS to the Army, Navy, and Air Force beginning in FY 1992. Funding for central activities, such as software maintenance, was kept in Health Affairs.

Question. Provide for the record the CHCS funding in the FY 1990 budget and accompanying FYDP by appropriation, fiscal year, and line item for fiscal years 1987 through 1994.

Answer. The following shows the approved funding level for CHCS requirements in fiscal years 1987 through 1994.

[In millions of dollars]

	Fiscal year—							
	1987	1988	1989	1990	1991	1992	1993	1994
DMS:								
O&M	55.6	37.8	44.3	50.6	51.0	22.6	26.9	24.2
Proc	19.4	50.3	20.5	21.6	28.1	1.4	1.8	1.5
Army:								
O&M	0	0	1.3	4.6	6.9	16.4	15.9	22.7
Proc	0	0	0	0	3.4	13.6	2.0	6.3
Navy:								
O&M	0	0	0	0	0	9.5	15.0	15.0
Proc	0	0	0	0	0	0	0	0
Air Force:								
O&M	0	0	0	0	0	9.8	10.8	13.8
Proc	0	0	0	0	0	6.2	1.2	3.2

Question. Are you aware that under the Bush budget amendment the Army offered up $2 million of FY 1990 Army O&M funds for CHCS deployment?

Answer. Yes. That reduction, as well other Army and Navy reductions to the FYDP are included in the response to the Committee's question on CHCS funding.

Question. Why did OSD agree?

Answer. As a result of the Defense Department's review of funding and reduction priorities during preparation of the budget, the Army CHCS reduction was finally approved.

Question. What is the impact on the CHCS deployment?

Answer. Unless the funds are restored, some Army sites late in the deployment schedule will not receive CHCS. Initially, the Army reduction of $4 million in FY 1990–1991, and the $8 million reduction in FY 1992 will delay the deployment and subsequent realization of benefits at Fitzsimons Army Medical Center and Brooke Army Medical Center.

Question. Would this have been a problem had the Department complied with the Committee's direction?

Answer. It is difficult to determine what budget decisions may have been made with complete centralized funding.

Question. Is the Army not interested in upgrading the computers at its hospitals with a modern, state-of-the-art system?

Answer. The Army is very interested in upgrading its medical automation. However, the Bush budget reduction decreased Army medical funds by $2 million. Because direct patient care programs were unable to absorb the reduction, it was applied to medical automation, a growth program.

Question. Did any of the other services also "bail out"?

Answer. The Navy has zeroed out its CHCS procurement funds for FY 1992, 1993, and 1994.

Question. The Committee directed central funding specifically to promote the timely and logical deployment of CHCS, so that maximum benefits could be realized for minimum cost. The Committee is concerned that multi-Service control of funds could jeopardize this goal. How will decentralized funding as suggested in the

budget promote economy, control, cost efficiency, and good management within the funding cap?

Answer. Decentralized funding is intended to support economy, efficiency and control within the funding cap at the Military Department-level within the Department. Further, it would permit the Military Departments to more directly control their implementation of CHCS.

Question. In the case of CHCS, where a central prime contract is involved, doesn't decentralized funding actually increase administrative costs and make the management process more complicated and inefficient?

Answer. While centralized funding has been retained for key CHCS activities such as software maintenance, decentralized funding will provide Service-level management flexibility for deployment.

Question. Have any significant changes in the CHCS budget occurred since funding control was decentralized? If so, do you concur with these changes?

Answer. Since funding control was decentralized the Army and Navy have made adjustments to the CHCS budget. These changes were made within the constraints of recent Department of Defense budget reductions.

Question. Now that CHCS is actually operating in a live environment, the natural process of finding new uses and needs for the system can be expected to take place. Is the program sufficiently funded to test those kinds of changes?

Answer. No. System changes to improve health care provider support have been broader than expected. Additionally, requirements stemming from emerging DoD health care management initiatives, such as Diagnostic Related Groups, are not budgeted.

Question. The committee is aware that, in addition to CHCS, the department is working on comparable medical automation support for theater applications. What are the Department's plans to integrate medical peacetime and wartime automation systems?

Answer. The Department is defining an information systems architecture for the military health services system, to standardize automated data, applications, and technology and to allow these systems to interoperate.

Question. How do JOTMIS (Joint Theater Medical Information System) and Army's TAMMIS (Theater Army Medical Management Information System) fit in?

Answer. JOTMIS is a quad-Service approach to theater medical automation to support the delivery of combat medical care under a concept of joint theater operations. The definition and validation of JOTMIS requirements, which include standard, data elements, processes, and interfaces to DOD systems such as CHCS, is complete. A system development decision has not been made, and funding sources have not been identified.

TAMMIS directly supports the Army's medical theater mission, and includes pieces of the JOTMIS requirements set. TAMMIS is in operational testing, with a MAISRC review planned for later this year.

Question. Provide for the record the funds in FY 1987 through FY 1994 by appropriation, fiscal year, and line item for JOTMIS, TAMMIS, and other related DOD medical programs.

Answer.

[In millions of dollars]

	Fiscal Year—							
	1987	1988	1989	1990	1991	1992	1993	1994
JOTMIS:								
O&M[1]	0.20	1.52	1.21	0	0	0	0	0
Proc	0	0	0	0	0	0	0	0
TAMMIS:								
O&M[2]	0	6.0	7.6	7.0	6.3	6.2	6.5	7.2
Proc[3]	([4])	5.4	2.6	[5] 22.5	[5] 18.8	[5] 14.0	.1	.1
MP	([4])	2.6	2.7	2.8	2.9	2.9	3.0	3.1

[1] Budget Activity 8, Training Medical and Other.
[2] Program 84, Medical Activities.
[3] Budget Activity 2, Budget Line Numbers 132 & 133.
[4] Not available at this time.
[5] Listed amounts were reduced by $14.8, $11.4 & $10.4 million in the President's early-1989 reduction.

Question. When was the last MAISRC review conducted by OSD on CHCS and what were the results?

Answer. The MAISRC completed a Milestone II (Definition/Design) review of CHCS in March 1988. This resulted in approval to award the CHCS contract and proceed into operational testing. During late-1988 and early-1989, the MAISRC also reviewed and approved certain revisions to the CHCS program plans. These changes included an expansion of the scope of CHCS operational test and evaluation to 4 additional hospitals. The expanded test scope is expected to provide a more comprehensive program test assessment to support the revised Milestone III target of August 1990. A MAISRC in-process review is planned for late-1989 to assess program progress.

NAVY INTEGRATED DISBURSING AND ACCOUNTING SYSTEM

Question. Last year the Committee directed DoD to terminate Navy's IDAFIPS (Integrated Disbursing and Accounting Financial Information Processing System) or get it under control. GAO reports that the original budget of $91.4 million has grown to $165.7 million. Life-cycle costs used to justify the system to Congress have jumped from $91.4 million in February 1988 to $574.9 million. Implementation has slipped 7 years.

We understand that the results of the last MAISRC were that "the overall planning and design of IDAFIPS were not sufficient to support a revalidation Milestone II." What does that mean?

Answer. The referenced statement means that the IDAFIPS program was reviewed by the MAISRC and the MAISRC concluded that the overall program planning and design of IDAFIPS were not complete and did not meet life-cycle management policy requirements for a Milestone II. For example, the IDAFIPS design was not complete. As a consequence, the MAISRC could not validate that the program had achieved a Milestone II status. The MAISRC directed Navy to complete required activities to achieve Milestone II.

In recognizing the significant post-Milestone II activities that the Navy had completed on the primary IDAFIPS subsystem, the MAISRC also indicated that Navy could pursue certain specific post Milestone II activities on this subsystem if these activities were essential to protecting the government's investment.

Question. We have spent $91 million dollars so far to develop this system (IDAFIPS), and apparently you think the design is not good. Why continue it?

Answer. The primary concern with the IDAFIPS design is not that the design is not good but that the design is incomplete. As a consequence, the MAISRC has directed Navy to complete IDAFIPS design efforts, including thorough system and subsystem specifications and interfaces.

Question. Is the system (IDAFIPS) now "under control" as the Committee directed?

Answer. Yes, the IDAFIPS project is under control. By withholding approval to proceed beyond Milestone II for all except the almost-completed FMS subsystem, expenditures are held to the minimum necessary to protect investments already made while design work is completed on the entire system. The large majority of the costs of the system cannot be incurred until approval is granted to deploy. This will require successful completion of the design efforts followed by a Milestone II approval and then successful development and testing of the system followed by a Milestone III approval. The MAISRC has also directed that Navy reassess the IDAFIPS economic analysis based on completed specifications and sizing estimates and an updated conversion estimate with detailed support, including a validated life cycle cost estimate, independent cost estimate and benefits estimate. These and other controls and oversight efforts provide effective life-cycle management control over the IDAFIPS project.

Question. Navy recently decided to move IDAFIPS to the Naval Data Automation Command's hardware. How much hardware was purchased under IDAFIPS when it belonged to other Navy organizations, and how will they now use it?

Answer. Approximately $7.5 million worth of hardware was purchased by the IDAFIPS the project for the overseas centers where there are no Navy Regional Data Automation Centers. If any equipment is not used for this or other IDAFIPS project requirements, it will be reported as excess and reutilized in the normal manner.

Question. What is the effect of the recent MAISRC decision on the FY 1990 funds requested in the IDAFIPS budget? Won't there be a slowdown?

Answer. While the MAISRC decision on IDAFIPS has temporarily withheld approval for certain planned fiscal year 1990 activities, it is too early to determine what effect the action may have on the project in FY 1990. Navy is currently working to complete project activities and planning revisions directed by the MAISRC. If design is completed in a timely manner and the Integrated Disbursing and Accounting Financial Management System (IDAFMS) prototype is successfully demonstrated, the project may be in a position to fully execute its FY 1990 budget.

EXCESSIVE ADP MAINTENANCE COSTS

Question. Your statement alludes to the Department's plan for improving contract maintenance support for general purpose computers.

Have you seen the February 1989 Air Force audit on this subject? It says:

"The Air Force is planning to spend $366 million in fiscal year 1989 alone. Maintenance support provided to general purpose computers was not adequately planned and performed, or effectively monitored and controlled. Maintenance planning was not effective for peacetime and mobilization. Maintenance records were not properly maintained and when maintained, not analyzed. Further, improvements were needed in the area of verification and certification of contractor maintenance payments. Finally, not all contract provisions were accomplished and maintenance was not obtained at the lowest total overall cost."

Apparently, we have a long way to go. Please describe the Department's plan for fixing these kinds of mundane but expensive problems.

Answer. The Department's strategy for improving contract maintenance support for general purpose computers focuses on actions required to:

Resolve the problems in ADPE contract maintenance found in prior audit reports (inadequate competition, failure to select the most cost-effective maintenance options, and inadequate performance monitoring of contract maintenance services), and

Evaluate the feasibility and benefits of centralizing contract maintenance management.

To correct identified weaknesses and achieve improvements in ADPE contract maintenance, the Defense Comptroller in January 1988 directed the Military Departments' and Defense Agencies' senior IRM officials and representatives to take those actions necessary to correct identified weaknesses by reemphasizing the importance of seeking increased competition, selecting the most cost effective maintenance options, and actively monitoring the contract maintenance services performed.

In addition, the Comptroller tasked the DoDIG to conduct an audit, with special emphasis on adequacy of competition, cost-effectiveness of maintenance options, and adequacy of maintenance contract performance monitoring, to determine whether weaknesses in this area exist. The IG forwarded a draft report of its audit in March 1989.

Question. What kinds of reviews have been made by the other Services and what were the results?

Answer. The Air Force Audit Agency, Army Audit Agency, and Naval Audit Service have performed audits of maintenance support to general purpose computers in the DOD. In general, the Military Departments' (MILDEPTS) auditors found that maintenance costs at MILDEPTS' installations could have been avoided by using more economical maintenance alternatives; increased monitoring of contractors' performance; consolidating maintenance contracts; and issuing policy guidance specifically for maintenance support of gen-

eral purpose ADPE which covers planning, acquisition, performance, monitoring, and controlling.

These audit results are documented in the following Service Audit Agency reports:

1. Army—Maintenance of ADPE, April 11, 1988;

2. Navy—ADPE Maintenance Management in the Department of Navy, March 10, 1988;

3. Air Force—Followup Audit—Maintenance Alternatives for ADPE, March 8, 1988, and DOD-wide Review of Maintenance Support for General Purpose Computers, February 14, 1989.

Question. We understand that the Committee's interest in this matter prompted OSD to revitalize its policies. What has been done to follow-up, to ensure that the policies are enforced?

Answer. The Department of Defense (DOD) has taken steps to include provisions on ADPE maintenance contracts in a new policy, DOD Instruction 7920.5, "Management of End User Computing (EUC)," issued in March 1989. This policy directs the DOD Components to use cost-effective hardware and software maintenance support alternatives when planning for EUC.

Upon review of the final DOD Inspector General's report on ADPE contract maintenance in the Department, the Comptroller will be able to identify any required changes to policies and procedures, and incorporate them into our ongoing update of the Life-Cycle Management Policy.

Question. Who in OSD is charged with fixing this problem?

Answer. The Defense Comptroller has policy responsibility for general purpose computing, to include ADPE contract maintenance. Each Component has implementation responsibilities.

Question. Provide for the record the funding in each fiscal year 1987 to 1991 for ADP contract maintenance by appropriation.

Answer. ADP contract mainenance has been reported by fiscal year on the exhibit 43A for each DOD Component. Details on the amount of hardware contract maintenance follow (dollars in millions):

Name of Component	FY87	FY88	FY89	FY90	FY91
ARMY	193.0	233.0	226.0	260.0	283.0
O&M,A	160.0	193.0	187.0	216.0	233.0
O&M.AR	1.0	2.0	4.0	5.0	7.0
O&M NG	1.0	6.0	8.0	10.0	11.0
RDT&E,A	4.0	17.0	15.0	16.0	19.0
MC,A	1.0	0	0	0	0
AIF	25.0	15.0	12.0	13.0	13.0
CWFR	1.0	1/	1/	1/	1/

Note: 1/ In FY90/91 budget the CWFR (Civil Works Revolving Fund) was broken into its feeder appropriations such as O&M Army or O&M National Guard.

NAVY	198.4	211.5	234.9	268.0	289.8
O&M,N	124.0	123.7	132.5	153.8	165.4
O&M.NR	1.5	2.0	1.3	2.7	2.8
RDT&E,N	2.7	3.4	3.7	4.6	5.5
MC,N	2.1	2.0	2.0	2.0	2.4
NIF	68.1	80.4	95.4	104.9	113.7
FH,N	<.1	<.1	<.1	<.1	<.1
MC (O&M)	18.5	16.3	15.6	20.1	22.0
AIR FORCE	226.8	277.1	363.3	420.9	451.7
Oth Proc,AF	19.1	19.1	19.1	19.1	19.1
O&M,AF	177.4	221.6	305.3	359.8	386.4
RDT&E,AF	24.2	25.4	27.1	27.9	28.5
O&M.AFR	1.2	1.5	1.5	1.3	1.3
O&M,AFG	4.9	9.5	10.3	12.8	16.4

Name of Component	FY87	FY88	FY89	FY90	FY91
DARPA(RDT&E)	0.1	0.1	0.2	0.2	0.2
DCCA(O&M)	0.8	1.1	2.6	3.7	3.8
DCA(O&M)	8.7	8.7	10.7	12.3	13.8
DCA(RDT&E)	0.1	0.3	0.5	0.6	0.6
DIS(O&M)	0.4	0.8	1.0	1.1	1.2
DLA(O&M)	21.5	22.6	23.4	24.3	25.0
DLA(RDT&E)	0.7	1.0	0.8	0.8	0.8

DMA(O&M)	7.6	0.5	0.7	0.8	0.8
DNA(O&M)	1.1	0.3	0.7	0.5	0.6
DNA(RDT&E)	0.1	0.1	0.1	0.1	0.1
AFIS(O&M)	0.0	0.2	0.2	0.2	0.2
CHAMPUS(O&M)	0.0	3.7	4.9	5.0	5.3
DMSA(O&M)	8.5	0.6	7.5	6.5	4.8
DoDDS(O&M)	2.3	3.5	3.0	3.5	3.7
OIG(O&M)	0.1	0.3	0.3	0.3	0.4
OJCS(O&M)	0.0	2.2	2.2	2.5	3.1
SDIO(RDT&E)	0.2	1.5	3.5	3.9	4.2
USUHS(O&M)	0.2	0.2	0.2	0.2	0.2
WHS(O&M)	8.4	8.5	11.1	12.6	14.7
DTSA(O&M)	0.0	0.0	0.0	0.1	0.1
Total DoD	$698M	$794M	$913M	$1,048M	$1,130M

Ficsal Year 1987 data supports the FY 1989 Amended Budget. Fiscal Year 1988, 1989, 1990, and 1991 data supports the President's Budget submitted January 1989.

THE IBM PREFERENCE

Question. There has been much publicity about the allegation by six computer companies to the Secretary of Defense that the Navy has a bias for IBM products.

What is the status of DOD investigations into these allegations?

Answer. The Inspector General, Department of Defense (IG, DOD) terminated its overall review of the allegations after the General Accounting Office began a similar review. The Navy is investigating the allegations internally.

However, the IG, DOD is reviewing a Naval Military Personnel Command contract, one of seven contracts in question, and has issued a Quick-Reaction Report recommending that the specifications be revised to be less restrictive. The Navy has suspended the solicitation and will rewrite the specification to eliminate any appearance of vendor-bias.

Question. IBM is the largest computer manufacturer. What do you do during review of the Services' major ADP systems to ensure that all vendors are given an equal chance?

Answer. During MAISRC Review of programs the program acquisition strategy is carefully reviewed to ensure full and open competition. Specific procurement documents are not directly reviewed. However, vendor bias is easily identified and scrutinized when the fundamental structure of the acquisition is reviewed. Nearly every procurement action associated with a program reviewed by the MAISRC has been with full and open competition.

Answer. The DOD Automation Resources Management Systems (ARMS) data base shows that the following percentages of the Services' inventory of computer systems over $50,000 are IBM or IBM compatible:

	Total inventory amount ($M)	Amount ($M)/percent IBM	Amount ($M)/percent IBM compatible
Service:			
Army [1]	$1,006	$201/20.0	$89/8.8
Navy [2]	1,663	223/13.7	12/0.7
Air Force [2]	1,919	265/13.8	33/1.7

[1] Inventory data as of December 31, 1988.
[2] Inventory data as of March 31, 1989.

Question. Why does the Air Force not suffer the IBM problems that its sister services are accused of?

Answer. Department of Defense policies and processes are intended to achieve full and open competition on all DOD acquisitions. It is entirely possible that the recent allegations on Navy procurements are isolated cases. Further, since the investigations are not yet complete, it would seem too early to make comparisons at this time.

Question. Describe DOD efforts to move towards "open" systems.

Answer. The Department has placed high priority on efforts to move towards "open systems," by expanding and intensifying the

DoD's participation in standards development and identifying high priority standards needs.

Members of my staff became principal DOD representatives and assumed leadership positions in nongovernmental standards development organizations under the jurisdiction of the American National Standards Institute and the International Standards Organization. This helps ensure the timely adoption and implementation of high-priority standards needed by DoD. We also began working with OMB, GSA, and NIST last year to establish an interagency information processing standards policies and strategies group to identify and prioritize technical standards which are most needed by Government. With DOD, we have identified our top IPS priorities requiring early adoption to be "Application portability standards" which will provide interfaces for software, languages, operating systems, and data management systems; and "Open Systems Interconnection" standards which will permit standardized communications among different manufacturers's computer systems.

In the long run, we anticipate that standards for Application portability and Open Systems Interconnection will be used to maintain vendor independence, by reducing or eliminating vendor proprietary barriers to open systems architecture and increasing the potential for expanding the competitive field for AIS acquisitions. However, we may not see the effects of mandating these standards in Federal procurements for a minimum of three to five years and may be as much as ten years.

Question. In April 1987 the Deputy Secretary of Defense directed the Secretary of the Army to withdraw its ADP standards because they were anti-competitive. Army proposed standardizing on the IBM operating system for all its computers. The Committee's Investigative Staff reports that 88 percent of the Army's "sustaining base" computers (those operations of its bases with functions like pay, personnel, logistics, and finance) are IBM or IBM equivalents. Is this your understanding, and isn't this a much more severe problem than the Navy's?

Answer. It is my understanding that the Army's "sustaining base" systems are heavily reliant on IBM or IBM-compatible hardware. The Army use of IBM compatible systems for many of its "sustaining base" computers derives from actions taken in the early 1960's. During the early 1960's the Major Army Commands developed software to support functions such as financial management, personnel management and logistics management. This software became the workload baseline used for the ASIMS (VIABLE) acquisition. It was not cost-effective at that point to convert a significant amount of the software, and the ASIMS equipment was IBM software compatible.

The Army is in the process of developing new systems which have greater hardware independence through the use of standards such as Posix and Ada. The Army's steps should serve to expand, rather than limit, competition.

The Department views each non-competitive acquisition as a potential problem. One of the aims of the Industry Interface Initiative is to improve interoperability and, thus, promote competition.

COMPUTERS FOR THE ARMY RESERVES

Question. At our last ADP hearing, the DoD Comptroller indicated that RCAS was a high priority to both the Secretary of Defense and to him personally. Is this the new Administration's view?

Answer. The Department retained full funding of RCAS in FY 1989 and FY 1990. Furthermore, approval of the Mission Needs Statement for RCAS remains valid.

Question. Congress requires by law a pure competitive "A-109" approach with no restrictions or conditions attached to this acquisition in order to maximize competition. Does the Defense Department plan to fully comply with the law?

What has been industry's response so far to the A-109 approach under General Temple's management?

Answer. The Defense Department plans to comply with the law. The program manager, Brigadier General Carey, has indicated that multiple vendors have responded favorably to the approach.

Question. Congress requires by law that no government furnished equipment or software be used for RCAS because of internal Committee investigations which showed the active Army's plan to limit competition on this program by manipulating the GFE provisions. Does the Defense Department plan to fully comply with the law?

Answer. Yes, the Department plans to fully comply with the law.

Question. What accomplishments has General Temple made during the last year since he became responsible for RCAS?

Have there been any major disagreements between your office and his over fundamental technical issues or approaches?

Wouldn't you say that he is attempting to fully comply with our law and DOD regulations?

Answer. General Temple has appointed a new Program Manager, who has reorganized the Program Management Office and hired needed specialized personnel. A draft Functional Description of the program has been fielded for review and a draft RFP is scheduled for release in late June, 1989.

There have been no major disagreements and General Temple is proceeding to fully comply with the law and DOD regulations.

Question. In FY 1988, the Appropriations Committees required a plan from the Secretary of Defense outlining how effective automation for the Army Reserves would be achieved. The document submitted by the Department indicated an inability to agree with the active Army on a suitable approach and therefore is not a true plan. When will the Secretary of Defense submit his plan?

Answer. When the program requirements are finalized and documented in the Functional Description during the summer of 1989, then a comprehensive plan can be compiled by the Army and submitted to the Congress by the Assistant Secretary of Defense for Reserve Affairs. I understand that the plan will be submittted to Congress within 120 days after the successful completion of MAISRC Milestone I.

Question. OSD uses a "corporate" process to review major automated information systems called the Major Automated Information System Review Council (MAISRC). In fact, the Committee requires OSD to conduct quarterly MAISRC's on RCAS in order to keep it on track. Describe the results of these quarterly reviews.

Has the Assistant Secretary of Defense for Reserve Affairs ever bothered personally to show up for these meetings?

Answer. Quarterly reviews of the RCAS program have been conducted as required by the Committee. As a result of these reviews, OSD has directed that the Army group and prioritize requirements, develop basic program alternatives, present the MAISRC with an affordable option, continue aggressive management action and assure that the economic analysis, acquisition strategy and program alternatives contain common assumptions and consistent data.

Although the Assistant Secretary of Defense for Reserve Affairs has not attended these reviews, one of his deputies who is more familiar with RCAS details, has attended all of them.

Question. The Defense Department's "plan" for RCAS under the "stewardship" of the active Army was critiqued by the Committee's Investigative Staff in August, 1987. The report was never released to the Department. Here are excerpts:

"RCAS continues to remain a program in trouble, a poor candidate for Congressional approval . . ."

"The draft RFP actually released is considerably different from the earlier version provided to OSD"

"The RCAS DRFP is not an A-109 acquisition approach"

"Any use of GFE and existing contracts by RCAS will produce a cost to the government. The DRFP however does not evaluate costs associated with the use of GFE. This departure from proper cost accounting is an anomaly, insures that the bids of incumbent vendors EDS and CSC will be the lowest, insures that their bids will receive high evaluation on technical factors, and makes obvious the Army's desire to steer the RCAS contract in a particular direction."

Will the current RCAS legislation prevent the active Army from "hot-wiring" the RCAS acquisition to a specific vendor and force a truly competitive acquisition?

Answer. The program manager, who reports to the Chief, National Guard Bureau is responsible for the RFP and is proceeding with plans for a truly competitive A-109 acquisition with no GFE. Since this will be the product of the National Guard Bureau, the active Army would not likely have any opportunity to be directly involved in the RFP.

Question. Isn't it true that if the Congress had not interceded, the active Army's original RCAS acquisition plan would have exactly conformed to the standards which the Deputy Secretary of Defense directed the Army to withdraw in April 1987 because they were anti-competitive?

Answer. Since the final RFP was not reviewed and the final MAISRC Milestone I approval was not granted, it is difficult to determine what outcome may have occurred. However, Congressional intercession certainly represents a positive force in preventing such an action from happening.

Question. The Under Secretary of the Army wrote to the Committee in March 1989 requesting "modifications to Congressional guidance" on RCAS, specifically to eliminate our restrictions on government furnished equipment/software which had been enacted to prevent the abuses cited by our Investigative Staff above. Miss

Kendall, was this request coordinated with the Secretary of Defense?

Has General Temple indicated to you any problems from our requirements to exclude government furnished equipment/software from RCAS?

Industry tells us that the acquisition is much more simple if vendors are not constrained to conform to particular existing equipment or software: they would be free to bid the best available products. In short, they like it. Do you agree that the current approach required by Congress is more simple, straight-forward and less risky than the Army's original approach?

Answer. I am not aware of coordination with the Secretary of Defense. General Temple has not expressed any problem with the requirement to exclude GFE from RCAS. The current acquisition approach required by Congress is basic and straight forward. Vendors prefer it because they can provide anything to do the job.

Question. On January 19, 1989 Army General Harris briefed Under Secretary Stone on an active Army proposal which culminated in the request to our Committee to withdraw RCAS language. The Army proposes using 19 STAMMIS (Standard Army Management Information Systems) in a particular type of computer hardware (ACCS common hardware) in lieu of the competitive approach required by Congress. Has the Army shared this briefing with you?

Answer. The Army has not shared this briefing with me.

Question. Please provide for the record the initial and final fielding dates and total cost (including hardware) of the 19 STAMMIS involved: STANFINS-R, STARCIPS-R, STARFIARS-M, TC ACCIS, ULLS, AFMIS, SAAS-¾ SAMS-1, SPBS-R (TOE), DAMMS-R, IFS-M, SARSS-2, TAADS-R, MPR-JSS, PBAS, RCAPSS, SARSS-3, SIDPERS-3, SPBS-R (TDA).

Answer. See the following table:

	Program cost	Start	Stop [1]
System:			
AFMIS	37,042	Unknown	?/94
DAMMS-R	132,000	5/87	8/92
IFS-M	44,797	2/86	6/89
MPR-JSS	67,000	7/80	1/91
PBAS	53,576	4/83	10/91
RCAPSS			
SAAS-4	54,000	1/86	6/89
SARSS-2,3	298,000	4/81	12/94
SAMS-1	69,600	1/88	10/91
SIDPERS-3	147,900	1/84	2/91
SPBS-R(TOE)	318,000	10/85	3/93
SPBS-R(TDA)	51,500	1/89	8/89
STANFINS-R	137,427	10/80	1/90
STARCIPS-R	36,969	5/80	7/89
STARFIARS-M	8,986	12/87	11/91
TC ACCIS			
TAADS-R	26,400	4/86	12/89
ULLS (estimated)	421,000	7/95	10/97

[1] Stop date represents fielding, modifications continue after fielding to correct errors and change the system for functional needs.

Question. Explain how this approach differs from the original Army proposal which was rejected by OSD and Congress years ago.

Answer. Not having been briefed on the Army proposal, I am unable to make such a comparison.

Question. Explain how this approach would foster competition.

Answer. Not having been briefed on the Army proposal, I am unable to assess the impact on competition.

Question. Explain how General Temple's fielding date of FY 1992 for critical elements of RCAS would be satisfied under this approach.

Answer. Since I have not been briefed on the Army proposal, I am unable to address the impact on the fielding date.

Question. Explain how this approach complies with OMB Circular A-109.

Answer. Since I have not been briefed on the Army proposal, I am unable to assess compliance with OMB Circular A-109.

Question. Explain the software implications of directing vendors to use the ACCS common hardware computer.

Answer. Currently, plans for RCAS do not require vendors to use the ACCS common hardware computer.

Question. Explain why the Reserves would need a field ruggedized computer for a peacetime mobilization system. Does OSD agree that an expensive, hardened, ruggedized ACCS computer is needed at the 4,500 reserve sites instead of standard commercial DOD microcomputers?

Answer. The Reserve Component, like the active Army, plans to use the TACCS for training and their post-mobilization, deployed operations. RCAS will support mobilization and administrative efforts in peacetime using a non-ruggedized computer.

Question. Did General Temple coordinate on Mr. Stone's request to Congress?

Answer. The Army indicates that General Temple was present at the meeting when Mr. Stone proposed the changes to the National Guard, Reserve and active Army General officers directly involved in the support of RCAS efforts. OSD did not see the request to Congress and does not know if Lt. General Temple coordinated on the request.

Question. Are these the only 19 STAMMIS that the active Army thinks the Reserves need? If not, how many more would ultimately be necessary?

Answer. The following STAMIS provide functionality that the Reserve Component can use:

Army Civilian Personnel System;
Army Food Management Information System:
Command Automated Budget System;
Force Accounting System;
Integrated Facilities System;
Facilities Engineering Equipment Maintenance System;
Standard Army Ammunition System 1, 3, 4;
Standard Army Ammunition System DAO;
State Accounting Budget Expense Report;
Supply Accounting Management Information System;
Standard Army Maintenance System 1, 2;
Standard Army Retail Supply System 1, 2A, 2B;
Standard Installation/Division Personnel System 3;
Standard Property Book System-R TDA;

Standard Army Civilian Payroll System-R;
The Army Authorization Document System-R;
Transportation Coordination Automated Command and Control Information System; and
Unit Level Logistics System.

Question. How much would it cost and how long would it take to give the Reserves a system with as much capability as General Temple's RCAS under this alternative proposal?

Answer. This is difficult to assess since the RCAS functional description is not final and the economic analyses of the alternatives have not been performed.

Question. Please clarify the role of the current Under Secretary of the Army in those matters.

As Assistant Secretary of the Army for Financial Management was he the chief official responsible for the Army ADP?

Answer. As Assistant Secretary of the Army for Financial Management, he was the Senior Information Resources Management Official, and was responsible for oversight of Army ADP and IRM matters. Currently, the Director, DISC4 is the designated Senior IRM Official.

Question. In this capacity, was he responsible for the 1987 acquisition strategy that OSD and Congress rejected because it was "hot wired" to a specific company?

Answer. Mr. Stone was Assistant Secretary of the Army for Financial Management in 1987. In that capacity he had oversight responsibility over Army IRM and ADP matters. However, his personal involvement in the questioned acquisition strategy is unknown to me.

Question. As Under Secretary, did he propose to OSD removing the $140 million for RCAS under the Bush amendment? Why?

Answer. In the overall Army budget recommendations, a reduction in outyear procurement for RCAS was proposed. My office is not aware of the specific role the Under Secretary may have played in the RCAS funding proposal.

Question. As Under Secretary, did he approve General Harris' proposed alternative to what is required in law by Congress? Under what authority?

Answer. I was not briefed on the particulars of his alternative. However, I am aware that the Under Secretary of the Army did propose an alternative language in a letter to the Chairman of the House Appropriations Subcommittee on Defense.

[CLERK'S NOTE.—End of questions submitted for the record.]

WEDNESDAY, MAY 3, 1989.

AUTOMATIC DATA PROCESSING PROGRAMS—DEPARTMENT OF THE ARMY

WITNESSES

LIEUTENANT GENERAL BRUCE HARRIS, DIRECTOR OF INFORMATION SYSTEMS FOR COMMAND, CONTROL, COMMUNICATIONS, AND COMPUTERS

MAJOR GENERAL ROBERT D. WIEGAND, UNITED STATES ARMY, CHIEF OF STAFF, FORCES COMMAND

INTRODUCTION

Mr. MURTHA. The committee will come to order.

We want to welcome Lt. General Bruce Harris, who is the Army's Director of Information Systems for Command, Control, Communications, and Computers.

The Army's fiscal year 1990 budget for procurement and operation of non-tactical computers is $2.5 billion, of which about 70 percent is O&M funded. Much of this investment is made for computers in the Army's "sustaining base," which means commercial, off-the-shelf computers to run base level operations like personnel, logistics, and finance. A number of problems have surfaced recently which have caused the committee to focus on this topic today.

Today's hearing is conducted in open session since no classified material will be discussed.

General Harris, your prepared statement will be placed in the record at this point.

[The statement of General Harris follows:]

STATEMENT OF LIEUTENANT GENERAL BRUCE HARRIS

Mr. Chairman, members of the Committee, I am Lieutenant General Bruce R. Harris, Director of Information Systems for Command, Control, Communications, and Computers. I am here today at your request to discuss Army Automation, with emphasis upon the FORSCOM Information System, or FIS; Reserve Component Automation System, also known as RCAS; and the Army Standard Information Management System (ASIMS), formerly VIABLE.

These programs are examples of what are referred to in the Information Mission Area (IMA) as sustaining base automation programs; that is, they provide the Army with day to day automation support at the installation and headquarters levels. You may remember from my earlier appearance I remarked that approximately 41 percent of the Army's Information Mission Area annual budget is spent in this sustaining base environment. FIS provides information management for HQ, FORSCOM. ASIMS supports day-to-day functions such as finance, logistics, and personnel for the Active Component; RCAS will provide that same support for the Reserve Components in addition to mobilization planning and execution. Each of these programs performs, or will perform, unique functions for the Army.

As you are well aware, each of these has had problems in the past, or have undergone changes in their scope and purpose as they have been developed and implemented. I hope to outline the current status of each of these programs and to explain why each remains very important to the Army.

FORSCOM INFORMATION SYSTEM (FIS)

FIS is an information management system made up of a collection of personal computers (PCs) linked over Local Area Networks (LANs), that provides the U.S. Army Forces Command (FORSCOM) HQ staff with word processing, time management, electronic mail, spreadsheet, graphics, and data base management capabilities. The components are commercial off-the-shelf hardware (PCs and Distributed Processors), software, and telecommunications. Approximately 2,000 managers and administrative staff in the new FORSCOM Command and Control (C2) Facility are served by FIS. In December 1988, FORSCOM accepted delivery of the first 1200 workstation systems. The remaining workstation deliveries are to sustain the system; deliveries end in FY 92.

Before the new C2 facility was completed and occupied in 1987, the staff was scattered across Ft. McPherson and Ft. Gillem, Georgia, many in World War II vintage wooden buildings. Functions that could have benefited from automation support did not have access to that support in many cases. As the proposal for the new facility was approved and construction authorized, it became clear that an integrated information system was the best way to provide office automation support for the future occupants.

In 1985, FORSCOM received approval for the FIS Acquisition Plan and received Delegated Procurement Authority (DPA) for $29.4 million. A Request for Proposals (RFP) was released by FORSCOM in March 1986. In January 1987, FORSCOM awarded a contract to Boeing Computer Systems for $65.2 million. FORSCOM asked for an amendment to its DPA increasing it to $65.2 million, which was received March 6, 1987. Upon receipt of a letter from Congressman George Darden (D-GA) questioning the system cost and its compatibility, the Assistant Secretary of the Army for Financial Management chartered a task force to review the FIS acquisition. That task force found insufficient justification for cancelling the contract; at that same time the first industry contract protests were filed.

The Under Secretary of the Army, in light of those protests, commissioned a second inquiry group to investigate the FIS procurement. Industry protests were withdrawn based on this action. This group, staffed with Information Systems Selection and Acquisition Activity (ISSAA) procurement specialists and AAA auditors, found the acquisition to be flawed, primarily because cost had not been properly evaluated. The Under Secretary then ordered that the FIS contract be terminated for convenience, and that ISSAA assume procurement responsibilities for the recompetition. The five original bidders were notified that the RFP would be amended, and shortly thereafter, in May 1987, the second protests were filed with GSA.

In light of the need to occupy the C2 facility and the investment in time and resources already made by the government and the competing vendors in the source selection process, the decision was made to reopen competition to the original vendors, rather than to start the process over again. The status of the existing host processors was clarified through an amendment to the RFP, and vendors were given the opportunity to revise their proposals. To avoid invalidating the previous technical evaluations, the vendors were not permitted to make major revisions to their technical proposals. The General Services Administration Board Of Contract Appeals (GSBCA) dismissed four of the five May 1987 protests; and directed the Army to obtain a revised DPA from GSA. The Army subsequently requested and received the appropriate DPA.

The final award, for $43.5 million, was made to Boeing in December 1987. FORSCOM accepted delivery of the system in December, 1988.

The Army received an additional inquiry in September 1988 from Mr. Les Aspin, Chairman of the House Armed Services Committee, concerning irregularities in the FIS procurement. In his response, the Secretary of the Army said that while the Army erred in not properly evaluating cost and not wording the RFP in such a way that any ambiguity as to the status of the host processors would be eliminated, "No evidence has emerged of deliberate attempts to violate procurement regulations or criminal wrongdoing.".

RESERVE COMPONENT AUTOMATION SYSTEM (RCAS)

Army mobilization exercises in the late 1970's indicated a requirement for an automated information system to provide essential mobilization data. Without the data, the ability of the reserve components to meet mobilization requirements is severely hindered. The interest of your committee in correcting this deficiency is well known.

This requirement was to be originally satisfied through a program called the Continental Army Management Information System (CAMIS) which was initiated in 1979. Early in the CAMIS process, the Army developed a prototype called the Developmental Army Readiness and Mobilization System (DARMS), to provide limited basic automation capabilities to support mobilization and to validate the CAMIS requirements. In November 1985, the Army canceled CAMIS in favor of an approach that would integrate more fully the functional capabilities of the Reserve Components with those of the active Army. At that time, the status of DARMS was changed from developmental to operational to take advantage of the automation it afforded. In August, 1986, the Reserve Component automation program was restructured and named RCAS.

RCAS will be an automated system that uses state-of-the-art office automation, telecommunications, distributed data bases, and distributed processing capability to provide timely and

accurate information for planning, preparation and execution of mobilization, and improve the accomplishment of routine administrative demands in peacetime. It is to be a self-sufficient system capable of exchanging data with related information systems in the Active and Reserve Components.

As directed in the Fiscal Year 1988 DOD Appropriations Act, responsibility for RCAS was transferred to the Chief, National Guard Bureau and PM RCAS chartered. PM RCAS continues to satisfy quarterly HQDA and OSD Major Automated Information System Review Council (MAISRC) In-Process reviews and is currently pursuing an A-109 acquisition strategy. The FY 88 and FY 89 DOD Appropriations Acts prohibit the Army from using any now existing Government computer equipment, software or telecommunications resources in RCAS. PM RCAS has successfully conducted Functional Description workshops attended by field representatives and representatives from HQDA, NGB, OCAR, FORSCOM, TRADOC, AMC, HSC, and ARPERCEN, among others. To date, over 500 people have attended, participating in review of functional requirements and preparing the RCAS Functional Description. The draft was released to the Army Staff and to the MACOMs for review and comment on March 15, 1989. Release of draft RFP to industry is scheduled for late June 1989.

ARMY STANDARD INFORMATION MANAGEMENT SYSTEM (ASIMS)

One of the major automation processing resources in the sustaining base is the Army Standard Information Management System, a billion dollar capability. It represents approximately 5 percent of the resources spent annually on sustaining base information management, but provides almost exclusive service to accomplish day-to-day installation functions, such as logistics, finance, training, and personnel. ASIMS supports approximately 550,000 soldiers worldwide. Our current capital investment in the program is nearly $150 million. The current contract with Electronic Data Systems expires in August 1992. Modernization of this capability is necessary for the Army to provide responsive, timely, and accurate information to commanders for decision making. An OSD MAISRC will review the ASIMS program this year.

The Army plans a full and open competition to replace the current contract. This competition, which encourages innovation, alternate solutions to today's requirements, and permits flexible response to technology changes while guaranteeing continued services. Some of the possible design objectives for the next ASIMS contract are to better accommodate growth; to reduce contract and in-house operations and maintenance costs; to reduce peak demand for resources; to provide users/developers with a standard work environment; and to include areas not in the current contract.

CONCLUSION

In closing, I would like to say that I appreciate this Committee's interest in and concern with these programs. In their own realms, each is of great importance to the Army; we could not do without the capabilities they provide or will provide. The problems associated with RCAS and FIS have been considerable; the scope of the ASIMS recompetition makes it an issue of complexity and importance to the Congress and the Army.

Automation technology and our understanding of the power of automation have changed dramatically in the last decade and will likely continue to change at a similar rate. It is crucial that we combine control of automation acquisition with the flexibility to accommodate that change, and thereby improve our ability to execute our mission.

FORCES COMMAND PROCESSORS

Mr. MURTHA. Let me go to a problem which surfaced this past year and ask a detailed question about it.

In April of 1987, the DOD Inspector General published a report "prompted by House Appropriations Committee questions raised during the fiscal year 1987 Defense appropriations hearings."

It states: "Results of Audit: Forces Command and its installations did not follow Federal, DOD, and Army procurement regulations in the acquisition of IBM Model 4300 series computers. Forces Command and its installations separated acquisitions to avoid higher level oversight and approval authorty. Forces Command personnel did not follow competitive acquisition procedures. . . . As a result, Forces Command exceeded its acquisition authority, restricted competition, missed an opportunity to significantly reduce its contract costs, and impaired management's visibility over the purchasing and management of data processing equipment."

General Harris, if the Army did not follow Federal, Defense, or Army regulations, what regulations did it follow?

General HARRIS. Certainly, Mr. Chairman, there was room for improvement in the acquisition that is referenced in that report, but we should be cautious also in absolute statements that say we did not follow acquisition procedures for, in fact, we did, although there were omissions and errors made in the acquisition of that particular project.

I think it is worthwhile upfront saying, first of all, that that particular project has received a great deal of review, both by the Army, by the DOD, and by various investigative agencies and by this committee.

There were mistakes made and we have acknowledged those mistakes. Those mistakes have been, in fact, corrected, and we have taken steps to attempt to ensure that we don't make those kinds of mistakes again.

We did, in fact, follow the Federal Acquisition Regulations. There was no intent to maliciously separate those acquisitions in order to sidestep management controls. The acquisition occurred at a time in the Army and for that matter within the entire Defense Department when we were searching——

Mr. MURTHA. Wait a minute. We are not talking about the FORSCOM Information System or FIS.

General HARRIS. You are talking about acquisition of the host computers that were part of the VIABLE acquisition then.

Mr. MURTHA. You were talking about FIS?

General HARRIS. That is FIS, Mr. Chairman. We have several acquisitions that are involved in this and the committee had expressed interest in many of them, in all of them.

There is the FORSCOM Information System. There is the system now known as ASIMS, which was also known as VIABLE.

There was a spinoff of that procedure and that acquisition which led the Army to upgrade and procure additional IBM 4300 series equipments for operations at installation levels to meet requirements not addressed in the VIABLE contract.

Those are the principal ones I think that relate to that particular area.

Mr. MURTHA. Is it true that this particular acquisition—now, we are talking about the Department of Defense IG report, dated April 6, 1987 which occurred prior to FIS—isn't it true that this acquisition conforms exactly to the standards that the Deputy Secretary of Defense directed the Army to withdraw because they were anticompetitive?

General HARRIS. I am not sure what acquisition that you have direct reference to, Mr. Chairman. We established some standards, attempted to establish some standards within the Army in 1986. That was an attempt by the Army to fill a gap that was necessary because absent some standards, we were going to buy noncompatible equipment, and software across the entire Army, so we decided we had to have some standards.

We did a lot of work, a lot of surveys and meetings with people of industry and government and published some standards against which we proposed to make acquisitions and give us the ability to network systems across the Army.

Mr. AUCOIN. Will the chairman yield?

Are we talking about the acquisition that the DOD IG in April, 1987 referred to, which was an acquisition of IBM model 4300 series? The staff seems to suggest that it is. Is that the acquisition we are talking about?

Mr. MURTHA. Yes, that is right. That is the acquisition we are talking about.

Mr. AUCOIN. Mr. Chairman, if you would yield further, the citation in that IG report that you read to the General, and this was the IG's statement, that statement said that the—"Results of Audit: Forces Command and its installations did not follow Federal, DOD and Army procurement regulations in the acquisition of IBM model 4300 series computers." The General just said that they did follow regulations. The IG says you didn't follow Federal regulations, DOD regulations or Army procurement regulations, and that is what the IG says. I put some weight on the IG's report. That is directly from the language of the IG's report.

Mr. Chairman, if you would yield further, I am trying to bring this more closely into focus—your question was that that acquisition conforms exactly to the standards that the Deputy Secretary of Defense directed the Army to withdraw because they were anticompetitive. And you were asking, isn't it true that that acquisition conformed to the standards that the Deputy Secretary directed the Army to withdraw because they were anticompetitive? That requires a yes or no answer, and I think the answer is yes.

General HARRIS. It quite probably is yes, but the IG report is April, 1987, is that correct?

Mr. MURTHA. That is correct.

General HARRIS. And the acquisition was made in a time period considerably prior to that. The standards against which the question is based were not published by the Army until late 1986. They were withdrawn in 1987 as a result of several things, including the directive—the reviews and the directive of the Deputy Secretary of Defense to do so. The fact that the purchase of 4300 series took place and did in fact conform—if you will—by procurement of IBM, we conformed to the de facto standards of the industry that we saw

out there—is not directly related to the establishment of those standards and did not take place in violation of the——

Mr. MURTHA. How much money are we talking about here?

General HARRIS. It is $12 million.

Mr. MURTHA. Twelve million dollars?

General HARRIS. Yes, sir.

Mr. MURTHA. In other words, the IBM 4300 computers are how much altogether—that is the total cost?

General HARRIS. The procurement that you are addressing is about $12 million.

Mr. MURTHA. What about the software costs——

General HARRIS. That is a separate activity. But the 4300 procurement was an upgrade of base operations processing.

Mr. MURTHA. Are you going to buy the software from the same outfit that sold you the hardware?

General HARRIS. We may. If it was part of that procurement, it is included in the $12 million, but in many cases the software and the packages and the processes that we run are already established. We are talking about capacity and reliability as we upgrade the system. At the time that procurement was made, most of the activities and installations across the Army were dealing with hardware of the very early commercial series, the IBM 360 series that had been around for a number of years. It was old and slow and very limited in its capacity. We had in fact developed systems to run on those that fit the IBM environment, but you must remember where IBM was at that time we made those initial procurements, they were the leaders of the industry. I still have systems that are running on an IBM environment and until we finish the transition or we learn to network all of those things, we are going to be dealing with the left-overs of an IBM environment that we started 25 years ago.

Mr. MURTHA. Mr. McDade.

ANTICOMPETITIVE STANDARDS

Mr. MCDADE. You were running the shop in April of 1987?

General HARRIS. I was not. Lieutenant General Don Rogers was.

Mr. MCDADE. Are you familiar that in April of 1987 Deputy Secretary of Defense Taft wrote the Secretary of the Army——

General HARRIS. And told us to withdraw the standards proposed, yes, sir.

Mr. AUCOIN. For what reason?

General HARRIS. There were complaints from industry that the establishment of those standards gave certain manufacturers unfair advantage.

Mr. AUCOIN. They were anticompetitive.

Mr. MCDADE. This is Deputy Secretary of Defense Taft to the Secretary of the Army: "Three times in the past year it has been necessary to write the Army regarding OSD concerns that the information mission area standards and related implementation were unclear and could unduly limit competition. Both industry and the Congress have also criticized the application of these competition limiting standards to the Army's ADP procurement. Therefore, to prevent continuing confusion and avoid potential violations of Fed-

eral regulations, you must immediately withdraw these standards from use." He had to order you to do it, didn't he?

General HARRIS. He did in fact order us to do it, yes, sir.

Mr. MCDADE. Why did he have to do that?

General HARRIS. There were at that time, to the best of my knowledge, no existing standards against which we were to make procurements.

Mr. MCDADE. You were buying $2.5 billion worth of ADP at that time, weren't you?

General HARRIS. I don't know the number.

Mr. MCDADE. Five billion dollars or more?

General HARRIS. It was not more.

Mr. MCDADE. Was it $1 billion?

General HARRIS. I will provide it for the record.

[The information follows:]

The Army spent $1.8 billion on ADP and telecommunications in fiscal year 1987.

Mr. MCDADE. A billion dollars is kind of important, don't you think?

General HARRIS. Yes, sir.

Mr. MCDADE. Is $2 billion important?

General HARRIS. Yes, sir.

Mr. MCDADE. Could it have been about $2 billion?

General HARRIS. I don't know.

Mr. MCDADE. If you check, you will find out it was, and I don't understand why you have to have the Deputy Secretary telling the Secretary of the Army to tell people who are running the program that they are running an anticompetitive program and to reject the primary Army regulation. That is fundamental. Why on earth would a $2 billion program be run that is anticompetitive?

General HARRIS. It was not intended to be that way, sir. Again, I must take you back to that time and to earlier times when we bought hardware in which we had a great abundance of proprietary systems capable of running only with each other, capable of talking only to each other, capable of running software programs only on their own machinery.

Mr. MCDADE. Are you saying you only had one vendor?

General HARRIS. No, sir. Each vendor had their own way of doing business.

Mr. MURTHA. But everybody in the government had the same problem.

General HARRIS. Absolutely. We took action to correct that.

Mr. MURTHA. What happened was your agency ignored a directive by the Deputy Secretary of Defense, and what happened to the individual?

General HARRIS. No, sir, we did not ignore it. We, in fact, put through the changes.

Mr. MURTHA. A $12 million acquisition is a big acquisition, it may not seem big to you, but we think it is important. There have been a number of problems with this program, and it doesn't seem like the Army is holding these people responsible. We are. Twelve-million dollars is an important acquisition. Withdrawing of the standards as directed by the Deputy Secretary did not mean, however, that the Army was precluded from ever buying equipment

that met them. But you cannot have standards which operate to exclude competition.

Mr. McDADE. In 1987, the Deputy Secretary came to you and said to the Army Secretary, "Get these off the street", and you complied?

General HARRIS. We did.

Mr. McDADE. What standards are now in effect?

General HARRIS. We are using the open system standards that have been defined for us since 1987 by DOD and the other services.

Mr. McDADE. Since 1987?

General HARRIS. Yes, sir.

Mr. McDADE. You are saying that the IG report of 1987 refers to what happened in the past, prior to the Deputy Secretary's memorandum and not under the new standards?

General HARRIS. That is correct.

Mr. McDADE. Are you able to tell the committee your new standards are not anticompetitive?

General HARRIS. That is true, they are not anticompetitive.

Mr. McDADE. How were those standards formulated?

General HARRIS. I have the information here—they were formulated jointly between the services and the DOD and Federal agencies that deal with automation across the government.

Mr. McDADE. So are you telling me that if you go out to buy something in the Army that you apply the same standards for acquisition as the Navy, the Air Force, the GSA and everybody else?

General HARRIS. We apply the standards that are in existence. I assume the other services do too.

FORSCOM INFORMATION SYSTEM (FIS)

Mr. MURTHA. Let me ask about FIS because we have here another example of the committee having to go to the Army to get a problem straightened out. You had a RFP out, as I understand it, under which four or five companies were bidding for this particular contract. One bid is 50 percent higher, is that what the figure was, 50 percent higher than the other three or four companies?

General HARRIS. There were two in an upper range and three in a lower range, yes, sir.

Mr. MURTHA. But the one that was awarded the contract was twice as much as the lower range?

General HARRIS. That is correct.

Mr. MURTHA. After this was discovered and complaints were made, the Army went back and still gave it to the same contractor, is that accurate?

General HARRIS. That is correct.

Mr. MURTHA. As I understand it, there was a retired officer involved in this, he was involved in consulting, is that accurate?

General HARRIS. There is a retired officer who was a consultant with the firm that won the bid. I do not think that he was an employee of the company at the time.

Mr. MURTHA. He won the bid?

General HARRIS. That is incorrect. The company won the bid. I do not believe the general officer under question in this was not an employee of the company at the time it won the bid. We have had

several investigations, including one by the Army IG, one ongoing now by the Criminal Investigation Command. Neither investigation has found any evidence of wrong-doing.

Mr. MURTHA. He was not a consultant?

General HARRIS. No, sir he was not a consultant on the FIS acquisition.

Mr. HEFNER. Will the gentleman yield?

You say "won the bid", but there was nothing to win. If you paid twice as much as the low bidder—there was really no winning a bid, it was simply awarding of a contract.

General HARRIS. They are two separate procurements that we talked about. The procurement that is now under discussion is the one known as the Forces Command Information System, FIS. That was competitively awarded. There were, as I recall, five bidders. The facts, as stated by the chairman, are correct.

Mr. HEFNER. Did it go to the low bidder?

General HARRIS. It went to the high bidder.

Mr. HEFNER. That is my point, it wasn't a competition, it was an awarding of a contract.

General HARRIS. No, sir, it was a competitive bid, competitively evaluated, in fact it was re-awarded to the same contractor using a separate selection group at a subsequent time.

Mr. MURTHA. But you see the problem we are having, General. If we don't precisely ask the right questions, we don't get any answers. We are trying to establish what happened and make sure this doesn't happen again.

Obviously, if somebody hadn't complained, this award would have gone through and a company would have made a substantial windfall profit. That wasn't right under any set of circumstances. The same company then comes back, and even though you weren't there, the Army re-awards this contract to the same company which then makes a tremendous profit. That is not right. Whether the individual was involved or not, the information we have, and if there was a criminal investigation, I don't know about it, but the information we have is there was a retired general officer involved in this thing, and he was a consultant to one of the companies. You are saying he was not a consultant. The information we have is that he was.

But it certainly doesn't make any sense to me when a company bids twice as much, they are awarded the contract, and you go back to cancel it and then give it right back again to the same company.

General HARRIS. Let me try to shed some light on that. You have been misadvised as to the role played by the senior officer. We have investigated that.

Mr. MURTHA. The senior officer being the retired general officer?

General HARRIS. That is correct. He is now retired.

Mr. MURTHA. Now retired?

General HARRIS. He retired before the first award of the contract. He was a consultant to the company at the time that it won the award.

[CLERK'S NOTE.—General Harris testified "He was not employed by the company . . ." during the hearing, but his remarks were changed by the Army as shown above.]

Mr. MURTHA. Is he now employed by the company?

General HARRIS. He had been, but I believe he is no longer employed.

Mr. MURTHA. We are apparently not asking the precise questions. In other words, at some point he was in charge——

General HARRIS. No, sir, he was not in charge at the time the award was made.

Mr. AUCOIN. Was he involved at the time the award was made?

General HARRIS. No, sir, he had already retired.

Mr. AUCOIN. He had nothing to do at all with the award?

General HARRIS. He was in a position of responsibility at the time that the program was initiated, but he was not involved at the time that the contract was awarded.

Mr. MURTHA. Let's go down to——

General HARRIS. I am concerned about the impression being offered that the officer is guilty of wrong-doing. We have had two investigations. I will admit that the proximity of the officer to the process has caused some clouds to come over it, but there have been two investigations, both of which clearly say that the officer is not guilty of wrong-doing.

Mr. MURTHA. What about the officer who was in charge of the actual award then?

General HARRIS. Those two investigations have found no indication of any criminal wrong-doing or intent on the part of anybody.

Mr. MURTHA. How can an investigation find a person not responsible when they give the same company the contract, at a substantially higher price, because of complaints it is cancelled, but they come back and award another contract to the same outfit? At least it is bad judgment.

General HARRIS. Your first question has to do with why did we award a contract to the high bidder. The emphasis on this contract, as stated in the RFP, was that technical solution is the dominant consideration of the award. It was twice as high as the second element, which was management, and the second element is twice as high as the third, which is cost. We had a breakout of 60 percent for technical solution, 30 percent for management and 10 percent for cost.

In hindsight, we can say that was wrong, but that is the way it was.

Mr. MURTHA. I don't question your technical requirement. What I am questioning is that you awarded at a high dollar level, and then turned around and re-awarded it at a lower dollar level to the same company?

General HARRIS. After the initial protest and after we withdrew the award, we reconvened under a separate command, the Source Selection Evaluation Board, we changed the selection authority. We took it out of the hands of the Forces Command, gave the evaluation responsibility to the activity within the Army that now works for me but then worked for the Information Systems Command, known as the Information Systems Selection Acquisition Agency, they make all of our big computer buys for all of the Army—they did a complete evaluation, and we changed the source selection authority to the Commanding General of the Information Systems Command. Although the price changed appreciably, two

vendors lowered their price, although the price changed appreciably, the award was still made to the same vendor but by a different Source Selection Board.

Mr. MURTHA. So they weren't penalized for over-bidding, there was no penalty for coming in at twice the price, and there has been no collusion proven between any of the people involved in this thing, but the only reason that the company had to come down in price is because of complaints, but they still got the contract?

General HARRIS. Yes, sir.

Mr. AUCOIN. Would the gentleman yield?

The impression I get from the response the General gave you to your question about why it went to the high bidder was that the way the RFP was structured, the technical solution was the governing criteria, and cost was somewhere else down the list of priorities.

But the committee has received a report from its Investigative Staff on this program, and the Investigative Staff tells us that the contract was awarded to the highest bidder but that several other technically acceptable proposals with substantially lower costs had been received by the Army. And the Investigative Staff goes on to say that the Army files show that four of five vendor proposals were actually rated "excellent" from a technical standpoint, which raises the question again then, why go to the highest bidder?

Mr. MURTHA. And then on top of that, you finally award it to them after they re-bid it at a lower figure. That is what is so irritating in the whole process. It makes it look like there is something wrong.

Mr. AUCOIN. A reason to believe.

General HARRIS. Let me address Mr. AuCoin's question, and then I need to get back to the question of cost.

The actual evaluation for the five bidders relative to their technical solutions in the final analysis, although some of the information that the investigating committee saw we believe to have been early, early assessments that were evolving—the actual adjustments or ratings that were given were one outstanding, one excellent and three satisfactory in terms of the technical solution.

Mr. AUCOIN. So our Investigative Staff was wrong?

General HARRIS. They looked at some early material, yes, sir. In that regard, we believe they were wrong.

Mr. AUCOIN. Did they confront you with findings that four out of five——

General HARRIS. They did not, and we have been unable to trace the source of that statement. But the final evaluation on technical solution was one outstanding, one excellent and three satisfactory.

Mr. MURTHA. But the outstanding one came down in price.

General HARRIS. By the time we had gotten back to the submission of the second contract proposal, we had moved down the road some 18 to 24 months from the time that all of the vendors had prepared their initial estimates. A great deal had changed in terms of the cost and availability of hardware during that period of time. A great deal more was understood about the technical risk that was or was not involved in the development of the system. And each of those would contribute to a lower cost, particularly if a

bidder had emphasized the technical solution over the cost solution.

In the second evaluation, we attempted to raise the value given to cost, and we did it marginally, but not by a great deal. To do so would have required us to go back and completely start from scratch on the second evaluation. The second evaluation kept the same vendors in the consideration. We allowed each the opportunity to revise their bids and make technical adjustments. The company under question made some changes, rather dramatic changes, as did the company that bid the second highest bid. Both dropped about the same amount.

But the award was made to the same company. That is now in being and is working fine at a cost of $3 million a year for the support that we have.

Mr. MURTHA. Mr. McDade.

Mr. MCDADE. Although the FIS contract was terminated, in the words of the Under Secretary of the Army it was fatally flawed. You chose a modification, not a new competition?

General HARRIS. That is correct. That is the point I just made.

Mr. MCDADE. Answer this question please. The new approach allowed vendors to use the host processors, yet did not allow them to significantly change their technical approach, which makes this meaningless except for the number one vendor whom you had already approved. Did you permit the other vendors to change their technical approach?

General HARRIS. Yes, sir, each were given the opportunity to make the changes.

Mr. MCDADE. You are denying that statement?

General HARRIS. Yes, sir.

Mr. MCDADE. So you deny that when you let the contract out that you prohibited other contractors from being able to change their technical proposal, you gave them a wide open opportunity to compete?

General HARRIS. The question of the use of the host processor has come up several times as we reviewed this procurement. There probably, as we looked in retrospect at the RFP, was probably room for confusion as to what people did or did not understand. In any event, as we re-competed, using the same vendors, we made clear what could and could not be done with the host processors and what they could or could not do with their technical proposals, and no favoritism was shown to any vendor.

Mr. MCDADE. A total opportunity to change technical proposals?

General HARRIS. Yes, sir.

INDUSTRY PROTESTS

Mr. MCDADE. Why does GSA constantly point out that the Army gets more protests than anyone else in the business—what does that say to you?

General HARRIS. Well, I am not familiar with that statement.

Mr. MCDADE. Just hold on for a minute then. In February of 1989, the GSA, which oversees all Federal ADP procurement, announced that more Army ADP procurements had been protested

formally than that of any other government agency. You are not familiar with that statement?

General HARRIS. No, sir, I am not. That doesn't mean that I haven't read it, I just don't recall it.

Mr. MCDADE. Then let's assume for a moment that it is accurate—what does that say to you?

General HARRIS. Unless I know how many of the protests were upheld, it doesn't mean anything.

Mr. MCDADE. Do you know?

General HARRIS. No, sir.

Mr. MCDADE. Does anybody in your shop know?

General HARRIS. Not that I am aware of. I know across the government we have protests on less than one percent of all the computer acquisitions that are made, but that statement by itself doesn't say anything about rulings. I would say maybe we had more protests, but maybe we have also more favorable rulings.

Mr. MCDADE. So you think the number of protests you receive when you put out ADP contracts is meaningless?

General HARRIS. I do not. I said what is important is whether or not the protest has substance to it and whether or not it is upheld.

Mr. MCDADE. Do you think potential vendors of the Army like to file formal protests with you?

General HARRIS. I have read articles over the last six months that indicate that very thing is going on, that they do, without basis.

Mr. MCDADE. Then why is it you, and not the Navy or the Air Force?

General HARRIS. I don't know. I don't know the numbers.

Mr. MCDADE. Does it say anything to you, does it raise a caution flag to you?

General HARRIS. Certainly we take every protest seriously, and I don't want to leave the impression that we don't.

Mr. MCDADE. You are saying that. You are saying it doesn't matter unless you know what the formal ruling was.

General HARRIS. I need to know how many are ruled against us and on what basis, and then we can find out what is wrong with the procurement. Every protest is taken seriously. There are some of them, in my view, that are filed lightly, but we have to deal with them, and if the company perceives that they have been wronged, then we have to deal with the perception as much as if it is actual. I don't brush them aside.

Mr. MCDADE. So your conclusion is you are not disturbed by the fact that you get a lot more than anybody else?

General HARRIS. I don't know whether the number is 10 or 1,000——

Mr. MCDADE. Why don't you find out and put in the record how you feel about it, put in the record how many of them have been upheld since you say that you are not familiar with it.

[The information follows:]

During the calendar year 1988, the GSBCA issued 46 protest decisions which involved Army procurements. Seven (7) protests were granted. The balance of the decisions denied or dismissed the protests. Generally, the dismissals were a result of withdrawals, settlements, lack of jurisdiction and untimeliness.

MILITARY PAY ADP SYSTEM

Mr. McDADE. Last year we began to look at your request for an ADP upgrade for military pay. You asked us for $110 million, do you remember that?

General HARRIS. Yes, sir.

Mr. McDADE. The Army subsequently decided to use the Air Force system.

General HARRIS. Yes, sir.

Mr. McDADE. So we didn't have to spend the $110 million. Looks like maybe we decided to do something right for a change, right?

General HARRIS. We are in the process of fielding a modification to the Air Force pay system for the Army.

Mr. McDADE. You saved $110 million?

General HARRIS. We saved money and time.

Mr. McDADE. What was it—you came up here and got all the way through the budget process requesting $110 million for a new ADP system, and subsequently after a lot of discussions you decided that you would use the Air Force system? It seems it took a long time for you to look at the Air Force system and say "We can save some money."

General HARRIS. I don't know how long it took to make that call. We have done the same thing with the civilian personnel system. In both cases, we have decided not to spend development money in areas of high risk nor to spend development money that is not necessary, but in both cases to adopt a system now in being in the Air Force. Neither system is probably state of the art, but they are good enough.

Mr. McDADE. You put the civilian system in——

General HARRIS. A separate system, but it is a system already in being in the Air Force. We made the decision not to push the state of the art, not to continue in a high risk area but to buy and adopt one that worked. We had to change it a little bit, but it works.

Mr. McDADE. Saved $110 million?

General HARRIS. Saved quite a bit of money.

MILITARY PERSONNEL ADP SYSTEM—SIDPERS–3

Mr. McDADE. You are also involved in a military personnel system called SIDPERS–3?

General HARRIS. Yes, sir.

Mr. McDADE. What is the value of the SIDPERS–3 contract that you just awarded, including the cost of all the options?

General HARRIS. It is $42 million.

Mr. McDADE. Provide a breakout for the record by appropriation fiscal year and line item.

[The information follows:]

The SIDPERS–3 software engineering and development contract was awarded to STATISTICA, Inc., effective April 17, 1989. The contract was awarded for a period of four calendar years (encompassing five fiscal years) at a value of $42.3 million. The breakout (in $M) per fiscal year is as follows:

	Fiscal year—					Total
	1989	1990	1991	1992	1993	
OMA [1]	5.5	10.2	10.7	10.3	5.6	42.3

[1] Line item for all contract funds is Commercial Services, System Analysis/Programming.

General HARRIS. SIDPERS–3 is a continuing evolution of our personnel management system in the field. We field a SIDPERS 2, 2.5, 2.75, and now SIDPERS–3. SIDPERS–3, designed in eight modules, answers the needs of the Reserve components as it relates to personnel management.

Mr. MCDADE. Reserve component automation is another area that we will address later today. In the previous set of questions you told us that it was a good deal for the Army to use the Air Force pay system. Why didn't you then use the Air Force personnel system—just as well as the pay system?

General HARRIS. This is not a start-from-scratch project. This is a continuing evolution of our military personnel system that we began some good many years ago. And we have increased that as we have gone along. We would have to scrap everything that we have done, the system that is in the field, and bring on board a new personnel system. It is in our view wiser and less expensive to continue the evolution of this one.

Mr. MCDADE. Does your personnel system also provide data to the pay system?

General HARRIS. The two interact, and we are having to take special steps in order to make the Air Force pay system and our military personnel system interact.

Mr. MCDADE. In other words, the personnel system is broke, and you are trying to fix it—they don't work compatibly?

General HARRIS. They are, and both are evolving. We were developing the new pay system at the same time we were evolving the personnel system, and they were meshed. We have decided to continue with the evolution of the personnel system and field SIDPERS–3, but not to re-write——

Mr. MCDADE. Isn't it true that the Air Force pay system automatically feeds the personnel system, that they work together automatically?

General HARRIS. To some degree. And it will feed our personnel system as well. I am not familiar with the exact specifics.

Mr. MCDADE. You are not familiar with the exact specifics?

General HARRIS. Of how they interact, no, sir. We have accepted their civilian personnel system.

Mr. MCDADE. Why award this additional contract when you could have just picked up the Air Force system, which automatically feeds its pay system; why award a $42 million new program?

General HARRIS. We will have the same results at the time we field our personnel system and probably at less cost. That is to be fielded in 1991.

Mr. MCDADE. How much will the total cost be?

General HARRIS. It will be $42 million.

Mr. MCDADE. When will it be fielded?

General HARRIS. The system in the field?

Mr. MCDADE. Fully operable?

General HARRIS. We have a fully operational military personnel management system in the field now. We are continuing to improve on it, and included in that improvement, for example, are those seven or eight modules that are designed to specifically answer the needs of the reserve components.

Mr. MCDADE. Is there an automatic system which the pay——

General HARRIS. Yes, sir. That interfaces with the new system.

Mr. MCDADE. Before you looked at the SIDPERS–3 contract, did you go over and examine the Air Force system completely?

General HARRIS. No, sir, I did not.

Mr. MCDADE. Did your people do it?

General HARRIS. We made those kinds of reviews over the preceding years, yes, sir.

Mr. MCDADE. Put the results of what the reviews were in the record. We want to know what they found right and what they found wrong and detailed information.

[The information follows:]

Copies of reviews conducted in 1972 and 1984–85 are no longer available; however, shortfalls found at that time related to unique policies and procedures used by the Air Force and the Army. Another area of difference was the lowest level of Air Force military personnel management was at the installation level while the Army requirements included personnel management at the battalion and company levels. A thorough functional and technical review of the Air Force military personnel system is ongoing to ascertain if the current version of the system can meet our requirements. The results of the review will be briefed to the DCSPER and myself in late July. It is anticipated that the results of the review can be made available to your committee shortly thereafter.

Mr. MCDADE. Do you think money could be saved if you had the Air Force System?

General HARRIS. I don't think so. We are evolving the system, not replacing it. It did not need complete replacement. The personnel system and the military pay system did need complete replacement.

Mr. MCDADE. What is the total life cycle cost for SIDPERS–3, including hardware?

General HARRIS. We have as yet an unvalidated cost analysis provided to us that shows somewhere in the vicinity of $1.6 to $1.9 billion life cycle. There are a couple of things wrong with that. Whether we field SIDPERS–3 or not, the hardware is in the field and will continue to go to the field because SIDPERS 2.75 runs off the same hardware. There is no new hardware requirement associated with SIDPERS–3. Likewise, the cost estimate says that the cost of the user of that piece of equipment, the soldiers whose function it is to administer personnel records, are being charged against the life cycle cost.

In fact, we have taken a good number of people out of the force structure of the Army as a result of fielding an automated personnel system. We need to challenge those numbers because those are not SIDPERS–3 only costs.

Mr. MCDADE. Have you sent this system for review by OSD?

General HARRIS. No, sir. We had an Army MAISRC review the 14th of April. We are moving toward the next MAISRC IPR review in OSD I think late this year or early next year.

Mr. MCDADE. Are you getting the cart before the horse and awarding the contracts before——

General HARRIS. No, sir. The only thing that the contractor is doing at this time—although the contract is for the entire development and fielding—the only thing being done at this point, and we will have an additional review before we proceed, is concept development.

Mr. MCDADE. The Appropriations law states:

None of the funds made available by this act may be obligated for acquisition of major automated information systems which have not successfully completed oversight reviews required by Defense Department regulations.

General HARRIS. But we have Milestone 1 approval from the ASA(FM). That is concept development. We have not proceeded beyond the ASA(FM) Milestone 1, and that portion of the contract that is being executed right now is concept development, it is Milestone–1 work, not Milestone–2. We are not in violation of your guidance there.

Mr. MCDADE. How much have you obligated and expended to date on SIDPERS–3?

General HARRIS. We have let no previous contracts supporting SIDPERS–3. The only thing we have had in being is the Project Management Office that would have been working on it.

Mr. MCDADE. So the first contract is a $42 million contract?

General HARRIS. That is a phased contract for $42 million.

Mr. MCDADE. But there is a dispute between whether this contract is a $1.6 billion or a $1.9 billion deal?

General HARRIS. In my view, the life cycle cost is an inaccurate and inflated cost.

Mr. MCDADE. What is the low figure?

General HARRIS. It is $1.6 billion.

Mr. MCDADE. What you are doing is by obligating us to $42 million without a review, you are hooking us into this contract that is going to cost us $1 billion before you finish it.

General HARRIS. No, sir. That review charged against us the cost of the machines that are now in the field and will continue to be fielded whether we buy SIDPERS–3 or not. The current system runs off the same machines as SIDPERS–3.

Mr. MCDADE. DOD regulations say to do exactly that. They require you to cost out everything, including hardware.

General HARRIS. But that does not represent an increase in cost of doing business. In fact, we will see a savings over the life cycle cost as compared to what we would have done if we had left 2.75 in the field.

Mr. MCDADE. The point is, you haven't done the reviews, and we are trying to get a coordinated effort to make sure this whole process is done. That is why you see language in the bill. The purpose is to be together on it, not to be apart on it.

General HARRIS. I think we are in compliance with the committee's wishes and instructions. The system that is in the field is being upgraded. The contract cost of upgrading that is $42 million. Much of the remaining cost of $1.6 billion is going to be there whether we field a new system or not, and if we leave the old system in, it is less efficient——

Mr. MCDADE. I think when you have a $1 billion deal, you ought to be talking to DOD.

General HARRIS. We have Milestone–1 approval from the ASA(FM). What we are doing now under the first phase of the contract is Milestone–1 work, concept development. We let one contract rather than competing four or five contracts each for a separate phase.

Mr. MCDADE. Is that $42 million contract approved by the OSD office that has the review authority?

General HARRIS. That was within our authority to let delegated by OSD, yes, sir.

Mr. MCDADE. The answer is it was not reviewed, it was not approved?

General HARRIS. We did not move that contract to OSD for approval. That is a contract within our authority to approve.

Mr. MCDADE. On a $1 billion concept is what we are talking about.

General HARRIS. The concept of SIDPERS is $1 billion plus, whether we put SIDPERS–3 in the field or not.

Mr. MCDADE. That is the kind of contract we want conversation within the DOD. You didn't get approval to start it.

General HARRIS. We have had approval of SIDPERS for some good many years.

Mr. MCDADE. You didn't take this contract up and ask if you could approve it. You said that was within your authority, as you construe it.

General HARRIS. Yes, sir.

Mr. MCDADE. Even though the run-out costs can be $1.6 billion or $1.9 billion, whatever.

General HARRIS. If we didn't let the $42 million contract, the run-out costs would still be $1.6 billion.

Mr. MCDADE. Did OSD know you were doing this contract?

General HARRIS. Yes, as far as we know.

Mr. MCDADE. Did you have authority from the previous witness who is in charge of the Comptroller's shop to do this?

General HARRIS. We have Milestone–1 approval from the ASA(FM). Milestone–1 is conceptual development. The contract that we have let includes conceptual development, reaches beyond conceptual development, but we have put hooks on it so that we do not proceed beyond conceptual development.

Mr. MCDADE. You are staying under a threshold that will enable you to avoid full review?

General HARRIS. No, sir.

Mr. MCDADE. Why don't you discuss it and get a complete review of what the committee is concerned about? You have got a parallel system with the Air Force, you have your own system in the field, maybe there is a chance for savings. We just complimented the Army for saving $110 million after thrashing around a bit, but $110 million was saved on the pay system because you adopted the Air Force System.

Do you think it is possible that the Air Force pay and personnel system might work in the Army?

General HARRIS. I think we reviewed this and made the decision that although the pay and personnel system would fit with what we want, that the cost of transitioning to a new personnel system

and essentially junking the one we now have is more costly than proceeding with the evolution of the system as we now see it.

Mr. McDade. And proceeding with that is $1.6 billion to $1.9 billion?

General Harris. No, sir. Say I have one model car and I am going to buy another model car, it is going to cost me $20,000 to buy that car. If I keep the old car, I am still going to burn gasoline. The cost of gasoline, except that which changes in the consumption rate of the new car, should not be charged to the new car. You are going to burn gasoline if you drive the old clunker, and that is life cycle cost, whether you drive a 1945 automobile or a 1989 one.

Mr. McDade. Don't DOD regulations say you must include all that?

General Harris. We have.

Mr. McDade. Why do you give me an example about using gasoline in a Model T? We are talking about whether or not you should have included what was in the field and what the cost of this contract is. You are making it sound like you are buying $10 worth of gasoline and you are spending $1 billion here.

General Harris. We are not spending $1 billion as a result of going from SIDPERS-2.75 to SIDPERS-3.

Mr. McDade. You have got a cost estimate that you said has yet to be validated.

General Harris. That is correct.

Mr. McDade. And that cost estimate says the life cycle costs will be $1.9 billion.

General Harris. And if I don't field SIDPERS-3, it will still be $1.9 billion or greater because I have to maintain the system in the field. We believe that moving to SIDPERS-3, probably some place I have the numbers—over the life cycle of SIDPERS-3, which is the next version of the personnel system now in the field, we will save money as compared to leaving the one that is there now in the field. And the cost of fielding that and the savings incurred make it worthwhile and make it a more profitable, as well as a more responsive system than fielding the Air Force system in the Army. That is the bottom line.

Mr. McDade. I am not sure I agree with what you are saying, but we will see.

Thank you, Mr. Chairman.

Mr. Murtha. Mr. Dicks.

ANTICOMPETITIVE STANDARDS

Mr. Dicks. First I want to go back to the questions that were asked regarding anticompetitive standards. Prior to the Goldwater-Nichols reorganization, the Assistant Secretary of the Army for Financial Management was head of Army ADP. In April, 1987, the Army FM was Mr. Michael Stone, who now serves as the Under Secretary of the Army for Acquisition. What role did he have in publication of the anticompetitive ADP standards?

General Harris. I guess the bottom answer to that, Mr. Dicks, is I don't know. I was not a party to those discussions. I would suspect, however, that as we reviewed what we needed to do and reached those kinds of conclusions that the Army staff element

that dealt with that would have consulted Mr. Stone, but I don't know that for sure.

Mr. DICKS. Can you give us an answer for the record?

General HARRIS. Yes, sir.

[The information follows:]

The Assistant Secretary of the Army (Financial Management) did not approve the messages that provided the field with the draft or proposed automatic data processing standards.

YEAR END SPENDING

Mr. DICKS. In February, 1989, the DOD Inspector General made the following observation on Army ADP.

One of the primary concerns of managers of major command and station levels was the funding instability that accompanied automation programs. There were numerous complaints that funding was not allocated until late in the fiscal year, which reflected a lack of priority. Our analysis of four systems substantiates that approximately 75 percent of purchases are made in the fourth quarter with the majority of them in the last month of the fiscal year.

General Harris, why is there so much year-end spending associated with Army ADP?

General HARRIS. There are two parts to that answer, Mr. Dicks. One, of course, is that portion which is centrally procured under a competitive contract arrangement either by activities such as the Information Systems Source Selection and Acquisition Agency that does large-scale procurement, that is the activity for example in the Army that would do the large competitive procurement for administrative computers against which all of the services may then order. We have done several of those kinds of orders within the services in the last few years.

When you get into competitive contracting, there are any number of things that can cause you to move a contract award to the end of the fiscal year, depending on when the money was available, how soon we can go on the street with the RFP. I suspect that is not the one that prompted the comment.

The second part is that which is procured locally by local commanders using local funds and under authority that we grant them in accordance with the rules that we follow. There can be several reasons that those things go to the end of the line, so to speak. They compete with all other activities on the Post. Whether you are a training installation or a logistics installation. If you are a school, you know you must fund for the training of the soldiers, the paying of personnel, feed and cloth them, and only sometimes late in the fiscal year do you realize that you have enough funds that you can do other things.

Whether it is paving the streets that need to be paved, whether it is re-stocking POL supplies or whether it is buying small personal computers, it doesn't mean they are not important. It just means that some things you must fund early. I don't think that we are guilty of delaying that unnecessarily, and in fact of the computers that were procured in 1988, only about 15 percent of them were bought in the fourth quarter.

ANTICOMPETITIVE STANDARDS

Mr. DICKS. I wasn't here for the entire hearing, which I regret, because of other considerations. Generally how do you react to this charge that has been made that the Army is trying to tilt all the business toward one company? Is that fair?

General HARRIS. No, sir. The standards—we discussed this before you came in——

Mr. DICKS. This letter that Under Secretary Taft sent you is extraordinarily stiff. That is unusual, I would think.

General HARRIS. That was in 1987, a letter based on a 1986 action. This is 1989.

Mr. DICKS. You weren't there then, I suppose?

General HARRIS. Makes no difference. The action was reversed. We are in accordance with government and DOD standards. What we attempted to do even then was to ensure compatibility and interoperability of systems by specifying some level of standards. We were finding ourselves in a situation where the rules of open competition would lead us to buy what was financially sound at procurement time but not necessarily when we tried to make it work with other systems. We had a number of vendors offering their own way of doing things, and as we bought those—I bought one of those, one of yours and Mr. McDade's, and we couldn't talk. We made an attempt to standardize on one of them, which we thought represented the de facto standard of the industry at the time. We weren't successful in that. Whether it was a mistake or not, in hindsight we can evaluate that. We have DOD and government standards. We didn't have them then. We have them now and are complying with them.

Mr. MURTHA. Mr. AuCoin.

RESERVE COMPONENT AUTOMATION SYSTEM (RCAS)

Mr. AUCOIN. I wish we had more time to go back to some of the dangling issues that I think still remain, but we don't. Many questions will have to be submited for the record.

I want to use my time to talk about computers for the Reserves. We have been struggling for years with the Army to field a basic automation capability for the Army Reserves. They have practically nothing today. This year General Vuono testified, in his words: "I think we have not had a very good story on this subject", and Secretary Marsh testified before our committee that this has been going on for ten years.

General Harris, you are now the head of the Army's ADP community. Why has the ADP community failed to deliver a system to the Reserves after 10 years and $50 million worth of expenditures?

General HARRIS. First of all, let me say to you that I believe that General Vuono's comment was meant to express disappointment over the fact that we haven't responded to what we recognize is a genuine requirement to produce some automation support in the Reserve components.

We have had several false starts on that. The first was a system known as CAMIS, which began about ten years ago, I suppose. That stood for the Continental Army Management Information Systems being developed under principally Forces Command and

ISC. That was done in keeping with the Forces Command role relative to readiness and mobilization of the Reserve components.

We terminated that program in about 1986, along with another one called VFIDMIS, which had nothing to do with the Reserves, but for the same kinds of reasons. Each of those was being developed under a separate acquisition, each was to be a stand-alone system, each to have separate processing, each to have separate communication paths, each to run parallel one to the other, and all of that was the same as it related to the system that we then had in being known as VIABLE. We tried——

Mr. AUCOIN. You have tried for ten years.

General HARRIS. We tried to find a better way of doing that without incurring costs.

Subsequent to that, the committee directed us in 1987 that we try to do a RCAS program as a startup following CAMIS, and the committee further directed us in 1988 to initiate a program known as RCAS. That program is in being. So we have tried to do——

Mr. AUCOIN. Are you proud of the ten-year record and the $50 million——

General HARRIS. We are disappointed that we haven't been able to do that.

Mr. AUCOIN. Who runs the program now, General Temple?

General HARRIS. Yes.

Mr. AUCOIN. That is because Congress transferred responsibility for RCAS to the Reserves from the Army?

General HARRIS. That is correct.

Mr. AUCOIN. My reading of congressional history and legislative intent was that that transfer was done because the Congress finally got fed up with the track record and the delay and cost of the Army dwindling around and not getting results. The committee understands that you recommended to Under Secretary Stone, who recommended then to OSD, that $140 million be removed from RCAS during the Bush amendment, at the time the Bush amendment was being considered.

What I want to know is did General Temple, who is the program manager, concur with your recommendation? I would like to know if you advised General Temple of your recommendation?

General HARRIS. Sir, the committee has been misinformed. I made no such recommendation nor did Mr. Stone. The process that took place and led to withdrawal of those funds, during that process General Temple participated fully.

Mr. AUCOIN. I have correspondence from the Assistant Secretary of Defense for Reserve Affairs to the Army responding to the Army's proposal for amending the fiscal year 1990 budget to make a $140 million cut in the RCAS program. I have it here on page two of that letter, dated 10 March, 1989.

So the Army did, in fact, request a $140 million cut, and in Mr. Steven Duncan's response to the Army, he states in his letter to Deputy Secretary Taft on page 2, the Army's stated rationale for this reduction is that "this program must be re-defined during the fiscal year 1992–1997 proposal. Funds are retained to support a restructured management and software development program."

He is quoting the Army's rationale to OSD for the $140 million cut, which you indicated you didn't think was made. I think he is responding to a specific question.

He goes on to say that he is "greatly concerned that the Army appears to be using the program as a bank account. It is likely to be exceedingly difficult for the Army and OSD to locate funds during the next POM review to re-pay the proposed loan."

He goes on to say that "this would exacerbate an already testy political relationship with the Congress on the issue, discourage potential contractors from bidding on the project" and then says other things as well. So there was a proposed $140 million cut. What are you telling me?

General HARRIS. Sir, I don't deny that. Your question was did I make the recommendation to Mr. Stone? I did not. Did Mr. Stone make the recommendation——

Mr. AUCOIN. Who in the Army made the recommendation? Somebody made a recommendation.

General HARRIS. General Temple participated in it.

Mr. AUCOIN. He was advised?

General HARRIS. He was present at the time——

Mr. AUCOIN. Did he agree?

General HARRIS. We both expressed concerns relative to the program.

Mr. AUCOIN. Did you both express concerns about the $140 million cut?

General HARRIS. Yes, sir.

Mr. AUCOIN. So he did not agree with the cut?

General HARRIS. Nor did I. But you must realize——

Mr. AUCOIN. Who proposed it?

General HARRIS. It was a recommendation of a committee, if you will, within the Army, that was looking for some roughly $6 billion to be taken out of our budget.

Mr. AUCOIN. What committee?

General HARRIS. It was a committee made up of programmers, DCSOPS——

Mr. AUCOIN. Appointed by whom?

General HARRIS. A standing group of people that meet to respond to requests and directions to reduce the Army's budget.

Mr. AUCOIN. Are you on the committee?

General HARRIS. At one level or another, I become involved, as does General Temple.

Mr. AUCOIN. You were part of that committee?

General HARRIS. I was part of the committee that was advised of the recommendation.

Mr. AUCOIN. No, the committee who made the recommendation.

General HARRIS. Yes, sir, I was not part of that committee.

Mr. AUCOIN. I thought you said you were part of the committee.

General HARRIS. It proceeds in a process like Congress—subcommittee, full committee, Floor action. I was part of the full floor action, and the reduction stood. General Temple was there as well.

Mr. AUCOIN. You and General Temple were shoulder to shoulder opposed to that cut?

General HARRIS. The dollars that were in the budget that we took that action are left over from that budget which was submit-

ted under the RCAS initiative that the committee directed us to terminate, that the project manager has yet to present to us either a Milestone schedule or a funding profile that anybody in the Army or the Department of Defense can feel confident about. When he is able to do that and we are given the time to review it, then we are committed to funding that program.

Mr. AUCOIN. Where is he going to get the money?

General HARRIS. Sir, it is the same way we work on every program.

Mr. AUCOIN. Where?

General HARRIS. We cannot operate under a condition that says—I don't know how much the program is going to cost, I will tell you when the bids come in.

Mr. AUCOIN. How do you plan to restore the necessary funds to General Temple so that he can proceed?

General HARRIS. The Secretary of the Army and the Chief of Staff of the Army both committed to that action at the time the discussion was made.

Mr. AUCOIN. A reprogramming request?

General HARRIS. Within the Army allocations to meet the requirement as developed and provided to us by the PM. He has not done that.

Mr. AUCOIN. Before the Congress transferred this program after ten years of what I would call ineptitude, we received a report on the Active Army program from the Investigative Staff. You don't like what the IG and GAO said about your practices, so you probably don't like what our Investigative Staff said either, I understand that.

The Investigative Staff said about this program:

> RCAS continues to remain a program in trouble, a poor candidate for Congressional approval. The draft RFP actually released to industry is considerably different from an earlier version provided to OSD.
>
> The draft RFP is not an A-109 acquisition approach.
>
> Any use of government furnished equipment and existing contracts will produce a cost to the government. The draft RFP however does not evaluate costs associated with the use of GFE. This departure from proper cost accounting is an anomaly, insures that the bids of incumbent vendors EDS and CSC will be the lowest, insures that their bids will receive high evaluations on technical factors, and makes obvious the Army's desire to steer the RCAS contract in a particular direction.

Why didn't the Army do a bait and switch with OSD on the draft RFP?

General HARRIS. Sir, I don't know. The draft RFP on that particular action never got beyond that stage. We never issued a formal RFP.

Mr. AUCOIN. Why not? Is that because Congress took action?

General HARRIS. Yes.

Mr. AUCOIN. That is more a feather in the hat of the Congress, isn't it?

General HARRIS. We often see dramatic changes before the final RFP.

Mr. AUCOIN. You are going to see more dramatic changes from Congress if we continue to see this pattern.

General HARRIS. We very often see changes—

Mr. AUCOIN. Let me ask you, why would the Army not evaluate the cost of government-furnished equipment? Under your rules, if

vendor A bids $300 million with no GFE and vendor B bids $900 million of which most is GFE, vendor B wins at three times the cost because GFE means that the government buys the equipment to furnish to the contractor.

General HARRIS. I don't know whose logic that is. That is not mine, and that is terribly flawed.

Mr. AUCOIN. That is what the Investigative Staff said that the Army did, critics with whom you disagree.

General HARRIS. Any program that says we would provide the hardware and then pay three times as much for the program is wrong. There is no way we would do that.

Mr. AUCOIN. It is wrong, and that is why Congress took the action that it did.

General HARRIS. On the other hand, if there is a potential for saving development costs by using systems or equipment already in the field, we should consider that.

Mr. AUCOIN. Isn't it true that had Congress not interceded in this instance that the Active Army's version of RCAS that the Army sent to industry would have conformed exactly to the standards that the Deputy Secretary of Defense directed the Army to withdraw in that April, 1987 memorandum, because they were anticompetitive?

General HARRIS. I don't think so, because it would have been a competitive contract without any specification as to operating standards.

Mr. AUCOIN. Our Investigative Staff doesn't agree with you that it is competitive. The staff says that it makes obvious that the Army desires to steer the RCAS contract in a particular direction. That is not very competitive.

General HARRIS. If there was a desire to steer it in a direction, it is one that we still have issues about, having to do with whether or not we should be looking into the possibilities of using management systems already in being and applying those to the RCAS solution.

Mr. AUCOIN. On March 27 of this year, Under Secretary Stone requested this committee modify its RCAS language in the Supplemental Appropriations to remove restrictions on government-furnished equipment. We understand you gave Mr. Stone a briefing on January 19, 1989, where you suggested that the Army ADP community recapture RCAS and redefine it to be STAMMIS software systems on a particular type of hardware called the Army Command and Control common hardware.

Will you share this strategy with us?

General HARRIS. Be happy to. I have discussed this with the Committee staff. There are really two questions there, one having to do with A-109 and the other having to do with the 19 STAMIS. I am not sure about that number, but the number is not that important. A true A-109 competition has absolutely no restrictions to it. It says here is my problem; provide to me the best solution to my problem, no restrictions.

Mr. AUCOIN. Our bill calls for no restrictions.

General HARRIS. No, sir. The bill that we are dealing with, that would say that we should not include in an A-109 acquisition a di-

rective that you must use either government equipment or government software. And that is what the bill provides for.

But it is just as wrong to say that you may not use it as it is to say that you must use it, because there is a potential out there, and I don't know how big, for a vendor to come in and say, "Look, you have got $1 billion invested, half a billion dollars, whatever the number may be, in software programs already in being, 50 percent of the tactical computers that you are now buying by direction of the Congress are being sent to the Reserve components, allow me to build you a system that takes advantage of both of those, and maybe I can save you a few hundred million dollars.

Under the committee rules given us now, that is not an option available to us.

Mr. AUCOIN. Under that scenario, can a non-incumbent bidder participate?

General HARRIS. What do you mean by non-incumbent bidder?

Mr. AUCOIN. Can a non-incumbent bidder come in and make that claim to the Army?

General HARRIS. Any bid submitted——

Mr. AUCOIN. A nonincumbent vendor would be at a distinct disadvantage, would he not, under that scenario?

General HARRIS. Not necessarily. If he is a systems integrator, he is not hardware dependent. Most will be an integration bid and not a hardware bid. The problem that we are seeing now in large-scale systems like RCAS is not hardware. We can find a number of hardware solutions to the problem. The problem is software. We have a rather significant investment in software in what we believe to be rather modern state-of-the-art management information systems that we would like to leverage on.

Mr. AUCOIN. That existing stuff is in the Army, the Reserves have none of that?

General HARRIS. In some cases, that is true.

Mr. AUCOIN. They don't have much of it?

General HARRIS. Only because they don't have automation equipment fielded.

Mr. AUCOIN. Why then shouldn't they get modern new equipment?

General HARRIS. There is no argument on that, sir. I have not offered any disagreement with that.

Mr. AUCOIN. Then why tell the vendors what to bid?

General HARRIS. I have not. We have also told them what they cannot bid. Let me see if——

Mr. AUCOIN. We are simply telling you that the government can't furnish the equipment. But the contractor is free to propose any type.

General HARRIS. No, sir.

Mr. AUCOIN. You can bid on anything you want. We are talking about what the government can't furnish so that we can enhance competition here.

General HARRIS. I am not trying to step aside from that. We currently use the same stock numbers, requisitional procedures, depots and whatever we may put in there, to obtain and maintain records on equipment within the Reserve components that we use in the Active Army. We do not go to a different place and use dif-

ferent procedures. We have in the active Army Management Information Systems that are designed to enhance that, all of those procedures everywhere, from the unit level to the depot.

My discussions with your staff and his interpretation of the language is that I may not make those available to a potential vendor for use, that a vendor must redesign the systems from scratch and write the software to go with it. I disagree with that. The Army spent millions of dollars bringing those on line.

Mr. AUCOIN. Does General Temple disagree?

General HARRIS. To my knowledge, he has no disagreement with that philosophy.

Mr. AUCOIN. Does OSD?

General HARRIS. No.

Mr. MURTHA. Staff does not run this committee. What you say to the staff is not what happens. When we give you directions, it is from this committee, not from the staff.

General HARRIS. I am very clear on that, sir. But that particular issue is what is contained in the memo asking for relief from legislation.

Mr. AUCOIN. In whose memo?

General HARRIS. Mr. Stone's letter.

Mr. AUCOIN. That you did not intend to use government—

General HARRIS. We are not asking that potential bidders be directed to use existing software packages, although we are precluded—but that they not be precluded from using.

Mr. AUCOIN. You don't think General Temple disagrees with that?

General HARRIS. No, sir.

Mr. AUCOIN. Why did he tell me he disagreed?

General HARRIS. He has not expressed that to me.

Mr. AUCOIN. I would like the record to show that in conversation with this Member of Congress, who follows this issue because of his interest, that General Temple told me that his position is that GFE should not be included. Why don't you talk to General Temple?

General HARRIS. I have. We need to be clear on GFE because we are talking software and hardware. I have proposed that we review these STAMIS's for application within the Reserves.

Mr. AUCOIN. You are not the project manager. What are you doing proposing to General Temple anyway? He is the project manager.

General HARRIS. I have a responsibility, sir—

Mr. AUCOIN. We gave the project management to General Temple. What are you doing in this? This is not your sand box. You had ten years and $50 million to do this, and we said we are giving it to General Temple. What are you doing in this?

General HARRIS. The committee asked me to come over and discuss this.

Mr. AUCOIN. I am asking you, what are you doing telling General Temple what your objections are? You are describing some internal recommendations that you are making, and I would like to know why you are doing that. We told you and told the Army that General Temple is in charge.

General HARRIS. Because we see the opportunity to save an appreciable amount of money in this.

Mr. AUCOIN. General Temple?

General HARRIS. I have discussed this with him.

Mr. AUCOIN. You just can't let go of this even though Congress said let go. We are putting this in General Temple's hands, but you just can't get your hands off it, can you?

General HARRIS. In his conversations with you, did he indicate that he had agreed to use SIDPERS–3?

Mr. AUCOIN. I didn't talk to him about that.

General HARRIS. He has agreed to SIDPERS–3.

Mr. AUCOIN. Can General Temple do that by law?

General HARRIS. No.

Mr. AUCOIN. Then why are we wasting our time talking about that? The law says he can't do it.

General HARRIS. We attempted to get the committee to change its views on that.

Mr. AUCOIN. We said no, didn't we?

General HARRIS. No, sir, you have not responded to Mr. Stone's memo.

Mr. AUCOIN. Was there anything in the Supplemental bill that followed that recommendation?

General HARRIS. Not that I am aware of.

Mr. AUCOIN. Wouldn't you interpret that as a non-agreement?

General HARRIS. No, sir, not necessarily.

Mr. AUCOIN. We are going to have to have some more conversations. Your alternative approach here on this RCAS, if it were adopted, how many of the 19 software systems could be used by industry in the configuration they are today without further upgrade and modification?

General HARRIS. I am not sure where the 19 came from.

Mr. AUCOIN. Whatever the number is, how many could be used by industry in the configuration they are today without further upgrade and modification?

General HARRIS. There are some of them that have 100 percent application to the Reserve component needs. There are others that have 75, 85, 50, 35 percent direct application.

Mr. AUCOIN. Some require upgrades and modifications?

General HARRIS. Our proposal is that we only pay for the difference between 75 and 100 percent, not for 100 percent.

The second question that you asked was the meeting on January 19 about the 19 systems. That represents a view that says that right now with the functional description as developed by the program manager, that is more than 10,000 pages in length, we cover everything across there from mobilization of a unit to weapons accountability of three pistols at an armory in Dubuque, Iowa. It may include, although I don't know for sure, things as mundane as vehicle registration at Reserve centers. All of those cannot be treated equally in the level of importance as to what needs to be done first.

I contend that there is some number known as the critical elements, and they are moving toward those. We did not have agreement on critical elements as late as January. There are critical tasks that must be performed for mobilization and essential administration of the Reserve components. They would not include necessarily automation of weapons accountability at an armory.

Mr. AuCoin. Did you in the meeting on January 19 suggest that the Army ADP community recapture RCAS and redefine it?

General Harris. I don't recall saying that we should be in charge of that. I said we needed to define RCAS in scale and get it down to something that is manageable and fieldable in the near term.

Mr. AuCoin. Where do you come off making that recommendation? Congress just gave the program management to General Temple.

General Harris. I make those kinds of recommendations to every program manager that is involved with communications within the Army. If we do that, we can see a system in the field that will be responsive to the critical needs of the Reserve components in a reasonable period of time. If we don't do that, we are going to be a long time fielding that kind of stuff.

Mr. AuCoin. Is General Temple just a benign observer, he doesn't have concerns about timing and fielding and costs, et cetera? He is our program manager. Where is he on all this?

General Harris. General Temple certainly has a lot of interest in this program.

Mr. AuCoin. We have given him the responsibility, haven't we?

General Harris. I feel an obligation to advise him in these matters as well.

Mr. AuCoin. It looks to me like you are trying to pull the rug out from under him.

General Harris. No, sir. I would not argue against the need for RCAS. I have never argued against the need for it to be administered by the National Guard group.

Mr. AuCoin. Mr. Chairman, I have three additional questions to ask. I think it is important to ask, because I really cannot believe the material that we are covering here.

The restructuring and re-scoping that you recommended for RCAS is really, as I see it and understand it, an advocacy to run the program on a particular kind of computer rather than a competitively selected computer that General Temple envisions. Am I wrong in that?

General Harris. I suggested that we should give consideration to specifying that RCAS would be developed in an environment similar to that which the Reserve component soldier is going to find himself operating once he is mobilized. Under the current plan, we could well see a soldier doing day-to-day activities on hardware system A using operating system A and the day after mobilized, they must transition day-to-day operations to system B using operations system B because that is the Army standard.

Mr. AuCoin. System B would be more expensive?

General Harris. I think it would be less expensive, because we would not have to develop software programs.

Mr. AuCoin. How does your alternative strategy compare to the original strategy which was rejected by OSD and rejected by Congress two years ago, in large part because our investigative staff report indicated that the Active Army's plan to shape this competition focused the competition down to two incumbent vendors——

General Harris. It is different in one respect. I will preface that by saying that given my absolute preferences, I would say that any system that we field in the Reserve components for the day-to-day

operations of personnel and logistics and financial matters ought to be, if not the exact same, certainly compatible with the system that they are going to have to operate on when they mobilize. We are now putting—50 percent of the tactical computers at the unit level that we buy in the Army each year are being allocated to the Reserves, yet under the current plan for RCAS there is a probability that the solution offered will not run on those machines. So given my preference, I would direct that.

Mr. AUCOIN. What is General Temple's preference?

General HARRIS. I don't know if he has a preference on it.

Mr. AUCOIN. You don't think the program manager has a preference? You are more active in this than the program manager?

General HARRIS. Unfortunately, that is true, because this is an area in which I have the responsibilities.

Mr. AUCOIN. I thought Congress made General Temple program manager after your command had it for ten years.

General HARRIS. I have responsibilities even so, sir, to advise——

Mr. AUCOIN. Who has the most direct and immediate responsibility?

General HARRIS. It is General Temple's responsibility to field the system. It is my responsibility to advise him and the Army leadership if I think it can be done in a more efficient and cost effective way.

Mr. AUCOIN. You are coming from a great position since you had ten years of experience with it. Unfortunately the ten years didn't produce a result. That is a lot of experience, so I see why you feel you come from a position of considerable information.

Did General Temple have an opportunity to coordinate your briefing to Mr. Stone?

General HARRIS. The 19 January meeting, General Temple was in attendance.

Mr. AUCOIN. Did he have an opportunity to coordinate the briefing, or was he invited?

General HARRIS. It was a discussion, not a briefing, in which we addressed the issues of RCAS, the concerns we had about the prohibition on the use of already paid for and developed, as we call them, STAMIS's, management information systems, and an attempt to introduce that——

Mr. AUCOIN. Did he know ahead of time what you were going to suggest in that meeting?

General HARRIS. We had a number of discussions on this going back to late last summer.

Mr. AUCOIN. Can we have your assurance that to the best of your ability you will help General Temple find the $140 million that you just took from him in the Bush amendment?

General HARRIS. Yes, sir. There is no hesitation on that at all. I would point out to you that even though——

Mr. MURTHA. The time of the gentleman has expired. Mr. McDade, do you have any more questions?

Mr. MCDADE. No questions, Mr. Chairman.

Mr. MURTHA. We have other questions for the record. The committee will adjourn until 1:30 p.m.

[CLERK'S NOTE.—Questions submitted for the record and the answers thereto follow:]

ANTICOMPETITIVE STANDARDS

Question. Nothing is as important for effective acquisition of computers as having standards that allow equipment from different vendors to be interconnected. Yet, in April 1987 Deputy Secretary of Defense Taft wrote to the Secretary of the Army: "Three times in the past year it has been necessary to write the Army regarding OSD concerns that the Information Mission Area standards and related implementation were unclear and could unduly limit competition. Both industry and the Congress have now also criticized the application of these competition limiting standards to the Army's ADP procurements . . . Therefore, to prevent continuing confusion and avoid potential violations of Federal Regulations, you must immediately withdraw these standards from use . . ." We understand you actually published a regulation, not just a policy memorandum. How many people in the Pentagon have to coordinate on such a document? None of them were familiar with the competition requirements of Federal law?

Answer. A regulation was not published, only a message. The message was sent out following the effort of an Army study group; the group which developed the standards did analyze the requirements, alternatives and impacts attendant to those standards. The requirements for interoperability pervaded the Information Management Master Plans (IMMP) submitted by Army Commands and the Mission Element Need Statement (MENS) of every Army initiative for acquisition of an automated system. Alternatives considered for meeting those requirements ranged from no standards, to reliance on generic standards, to standardization on a single dominant vendor's architecture. Army consulted government standards organizations, many computer product manufacturers, as well as large data services firms, in assessing the alternatives and in selecting the final standards. Those consultations pointed to standards as the only viable and cost effective solution to the Army requirements, yielded the same uncertainty and conjecture which we now see in hindsight, but also indicated the standards suite selected by the Army was consistent with the trends of the mainstream of automation users in the private sector.

Question. What have you published since that time to replace the standards that were directed to be withdrawn?—if nothing isn't the Army still trying to implement them even though they have not been "officially published"?

Answer. The Army has issued standards guidance directing compliance with the emerging DOD approved generic standards and restressing full compliance with procurement regulations. Compliance in competitive acquisitions and competition limiting acquisitions above designated dollar thresholds is assured by review at Headquarters Department of the Army. Compliance of other procurements will be included as a topic of interest for future Army Audit Agency reviews.

Question. For the record, provide: Copies of letters, memoranda, or messages sent to Army field organizations instructing them on standards for ADP acquisitions after the OSD action in April, 1987; the names of all individuals and their Army officers who coordinated on the regulation concerning Army standards that was directed

to be withdrawn by the Deputy Secretary of Defense; and Army's plan for publishing acceptable standards.

Answer. Attached under are the documents requested. There was no regulation published on Army standards. The withdrawn standards were initially promulgated in an 11 June 1986 message signed by the then Assistant Chief of Staff for Information Management (ACSIM), LTG Doyle. Staff officers who prepared that message indicate it was coordinated with representatives of the OSD Comptroller, ASD (C3I), the Assistant Secretary of the Army for Financial Management, The Vice Chief of Staff of the Army, and the United States Army Information Systems Command (USAISC) prior to being released. However, the coordination sheets reflecting the names of those representatives are no longer available. Draft instructions for the implementation of those standards were prepared by USAISC, and were forwarded to the field for information under a 12 February 1987 letter from the Office of the Director, Architecture Design and Control, ACSIM. That letter was not coordinated as the instructions were in draft and were being revised within ACSIM prior to formal release. It was those draft implementing instructions which drew the extensive industry criticism and objection that resulted in the OSD direction to withdraw the actual standards. In regards to establishing acceptable standards, the Army established a hierarchy of standards and issued on 14 Dec 87 a message (copy attached) spelling out specific Federal Standards to be applied to Information Systems. The Army does not intend to publish standards in the future, rather to use international, national, Federal and DOD standards.

[CLERK'S NOTE.—The documents referred to above have been retained in the committee's files.]

FORCES COMMAND PROCESSORS

Question. In April 1987, the DOD Inspector General published a report "prompted by House Appropriations Committee questions raised during the FY 1987 Defense appropriations hearings." It states:

"Results of Audit: Forces Command and its installations did not follow Federal, DOD, and Army procurement regulations in the acquisition of IBM Model 4300 series computers. Forces Command and its installations separated acquisitions to avoid higher level oversight and approval authority. Forces Command personnel did not follow competitive acquisition procedures . . . As a result, Forces Command exceeded its acquisition authority, restricted competition, missed an opportunity to significantly reduce its contract costs, and impaired management's visibility over the purchasing and management of data processing equipment."

A two-star general was Chief of Staff of Forces Command under whose authority this acquisition was made. What happened to him—did he get reprimanded?

Answer. During the period of time covered by the DOD Inspector General report, 1982-1985, Forces Command had three Chiefs of Staff. All of them have retired. None were reprimanded.

Question. After the audit was published, what punitive actions were taken against other Army individuals who abused the system?

Answer. The DOD Inspector General Audit report did not name any individuals who had violated Federal, DOD, or Army Acquisition Regulations or who willfully intended to abuse the procurement process. Consequently, no punitive actions have been taken.

Question. Why did the Committee have to point this out to you, rather than you policing your own organizations?

Answer. The Army appreciates the Committees role in pointing out these particular instances of this problem; however, we were aware that this type of problem was occurring and had taken sweeping management reforms to address them. These reforms eventually led to the creation of the Information Mission Area and a major restructuring of ADP management. It is important to remember the events addressed in the DODIG report took place 4 to 7 years ago.

FORCES COMMAND INFORMATION SYSTEM

Question. The committee recently received and released to the Army a report from its Investigative Staff on FIS, another Forces Command ADP acquisition gone haywire. It indicated a number of serious irregularities:

The acquisition was originally delegated to a major command rather than being conducted by the Army's ADP selection organization;

Standard DOD and Army life-cycle management procedures were ignored;

An economic analysis was not made to determine the most cost-effective alternative for satisfying functional requirements;

The delegation of procurement authority from GSA was substantially exceeded—by over $35 million;

The acquisition plan approved in the Pentagon required "host computers" to be acquired competitively outside of the FIS procurement and the FIS RFP itself stated that such processors "are not part of this procurement and are not available to vendors * * *" Yet the Army picked the only vendor which bid a solution that upgraded these processors, at about double the price of all other vendors;

While the acquisition was being conducted, the Army leased one of these processors without the necessary authority instead of purchasing it on a more cost-efficient basis;

The contract was initially awarded to the highest bidder although several other technically acceptable proposals with substantially lower costs had been received, and Army files show that 4 of 5 vendor proposals were rated "excellent" from a technical standpoint;

"Decision briefing" charts for the contract source selection authority used a different rating scheme for the vendor proposals, and "no documents were identified that explained or supported raising the score of the high cost proposal and reducing the score of the low cost proposal";

Forces Command did not comply with Army Headquarters procedures requiring advance notification when cost estimates are exceeded by 20 percent;

A Pentagon review team from the Army's ADP community unanimously concluded that there was insufficient justification for suspending or canceling the award. Yet, a subsequent review directed by Under Secretary Ambrose found the FIS acquisition to be "fatally flawed";

Although the contract was terminated, the Army elected to press on with a "modified" acquisition approach rather than starting a new competition;

The new approach allowed vendors to use the host processors, yet did not allow them to significantly change their technical approach, which makes this meaningless except for the 1 vendor;

Under the new approach run by the Army ADP community, recommendations that more priority be given to cost as a criterion for contract source selection were ignored;

The same vendor with the highest cost solution whose contract was terminated was again selected, but at a lower cost than it originally bid; and

The perception from companies in industry based on interviews with the S&I staff that the Army did not "provide a level playing field" and "had a solution in mind" that prejudiced the acquisition.

Who is responsible for this? What punitive actions were taken against Army individuals who so clearly abused the system?

Answer. Although the Criminal Investigation Division Command is still investigating allegations in this matter, to date there has been no report of "abuse of the system" which justifies punitive action. There have not been any findings of manipulation of the system or impropriety in any of the numerous reports resulting from official audits, inquiries, and investigations concerning the FIS procurement.

Question. Why did the Army ADP community unanimously agree with the original acquisition that Mr. Ambrose later termed "fatally flawed"? Does your staff consider this a "model procurement"?

Answer. The question refers to the fact that two Army review teams looked into this acquisition. The first review consisted of briefings by Forces Command personnel and document examination. This review concluded that there was insufficient justification to cancel award. The Under Secretary thought a more in-depth review was required and chartered a second review group. This group reported procedural flaws that only a detailed analysis of the RFP and evaluation documentation could uncover. Based on the results of the second in-depth review the contract was terminated. The Army does not consider FIS to be a "model procurement."

Question. Once the Pentagon discovered that it was totally messed up, why didn't you start a new acquisition?

Answer. The Forces Command Information System was to be installed in a new Headquarters building which had just been completed and awaiting occupancy. Carpeting could not be installed until after the Local Area Network was installed, which was a part of the FIS acquisition. No personnel could be moved, and expenses for existing quarters continued to run. It was costing the Army

each day the building was unoccupied. The Army determined to use a modified acquisition approach rather than start a new competition because the modified acquisition approach provided the best means of insuring a fair treatment for the vendors while minimizing delay and cost to the Army.

Question. Under the Pentagon's modified approach, you instructed vendors they could upgrade the host processors that were supposedly not part of the acquisition. What was the point of allowing the vendors to now upgrade these machines, but forbidding a change to their technical solution? Isn't that really impossible except for the vendor which you had already chosen?

Answer. The vendors were offered the opportunity to change their technical solutions. It was the Army's opinion that although there were conflicting statements, the RFP always allowed an option for the host processors to be upgraded. The decision was made that this should be clarified in the RFP by issuing an amendment. While the review team had recommended that vendors be allowed to change their proposals, it was decided that this action would unnecessarily delay the acquisition and would be unfair to the vendor who had won the initial award as their proposal had been exposed. One vendor protested the decision not to allow significant changes to proposals. As a result the GSBCA directed the Army to restart the acquisition and allow vendors to make any changes they wished. This was done. Only one vendor significantly changed its proposal.

Question. In retrospect, how competitive was your modified acquisition for the Forces Command Information System?

Answer. In restrospect it seems that the modified acquisition provided as competitive an acquisition as possible under the circumstances as addressed in my answers to the previous questions.

Question. How long does the current FIS contract last?

Answer. The FIS contract is an indefinite quantity one-year contract with renewal options for seven years. It was awarded on December 31, 1987. If all options years are exercised it will end in 1995.

Question. Why don't you terminate it now and run an honest competition?

Answer. It would be extremely expensive to terminate this contract and recompete the requirement now. The initial system including Local Area Networks, Distributed Processors, and workstations has been purchased and installed. This is about $10 million worth of hardware.

Question. How much is budgeted in FY 1990 for all costs associated with FIS? Provide an exact breakdown for the record.

Answer. There is $2.9 million in OMA budgeted in FY 1990.

Question. Congressman Darden has both written to the Army and contacted the Committee on the role that a former Army general played in this acquisition. Does the Army feel that the general's influence was an undue advantage to winning company?

Answer. None of the participants in the source selection process knew of any impropriety or attempts to influence the source selection by any retired military official. One retired senior military official visited FORSCOM Headquarters as a representative of the winning company, but his visits were overt. A Government legal

opinion on a retired official's request to tour the new Headquarters building indicated contact with noncontracting personnel was not improper. The building was opened to other contractors for tours. There was no evidence that anyone improperly discussed FIS procurement during the tours.

Question. What is the connection between the computer processors that were illicitly obtained here under the FIS procurement, and those mentioned in the previous set of questions that were illicitly acquired at Forces Command without following Federal, Defense, or Army regulations? Are they the same machines? Are they networked or otherwise linked together?

Answer. The DOD Inspector General report that was the basis for the previous set of questions did not cover the Forces Command hosts. They are not the same machines. The Forces Comamnd hosts are not networked or linked together.

Question. Provide for the record the names, positions at the time, and current positions of the Army individuals who participated in the FIS procurement.

Answer. The Source Selection Authority for the initial procurement was the Deputy Chief of Staff for Resource Management, Forces Command. For the reprocurement the Source Selection Authority was the Commanding General, U.S. Army Information Systems Command and the Chairman of the Source Selection Evaluation Board was the Group Manager, Acquisition Division, U.S. Army Information Systems Selection And Acquisition Activity.

Question. What role did the current Undersecretary play in FIS?

Answer. The current Undersecretary of the Army was not a part of the FIS Source Selection process. He reviewed the award after it had been protested and in turn (along with others) brought the procurment and the protest to the attention of the then—Undersecretary.

EUROPEAN COMMAND WOES

Question. A February 1989 Army audit of ADP operations in Europe states: "Improvements are needed in nearly all areas of life-cycle management of automation equipment to make sure operations are cost effective. These areas include (1) automation planning, (2) equipment justifications and design, (3) equipment funding and acquisitions, (4) programming and execution, (5) microcomputer use, and (6) equipment accountability and reporting."

"Automation plans * * * were not fully developed and documented * * * established planning procedures were not followed."

"Automation management plans with requirements valued at $138 million did not show a clear direction for meeting automation goals."

"Because the planning process was incomplete, command managers could not be sure approved initiatives would satisfy user requirements, and plans included some excessive and duplicative requirements."

"Solutions to users' automation requirements were frequently not the best solutions."

"O&M funds, instead of procurement funds, were used to purchase automation equipment in excess of the Department of Army funding limitation."

"* * * equipment was purchased without proper approval."

"The automation funding process was not linked to initiatives approved in the automation management plan * * *"

"Microcomputers had low usage * * * more microcomputers had been purchased than necessary * * * approved purchase requests for new equipment could be cancelled if excesses were identified and redistributed to satisfy new requirements." "At 3 headquarters staff elements, about 58 percent of the automation equipment on hand was not recorded, and not all equipment could be located during physical inventories * * *"

"Software development and documentation were not adequately controlled." General Harris, what's wrong with Army ADP in Europe?

Answer. Concurrent with the surge in the growth of automation, there was a maturing of the process and procedures implemented to manage ADP. Involved with this has been the need to capture ongoing efforts that had no central process or common methodology for identifying requirements. This process is in place today, but we must still try to merge our in-process efforts with current discipline and requirements. We are working with the Commanders in Europe to remedy the situation. Corrective action is being taken for those issues which have not already been corrected or resolved.

Question. How much do you annually spend for ADP in Europe?

Answer. An average of $103 million was spent each year for the period FY 1987 to FY 1989 for ADP in Europe.

Question. What is your "get well plan?"

Answer. ASIMS has greatly improved the ADP situation in Europe. Recompetition of ASIMS will improve the processing capacity in Europe. The Army Information Plan will continue to maintain Europe at a high level by providing a comprehensive planning process.

ACQUISITION AT TRAINING AND DOCTRINE COMMAND (TRADOC)

Question. A February DOD Inspector General report disclosed that the Army Training and Doctrine Command had underway a $211 million computer program called Decision Support System. The IG said: "We found that the TRADOC prototype Decision Support System, which used incremental funding and acquisition practices, lacks life-cycle management documentation and appears to exceed GSA blanket delegation procurement authority of $2.5 million." General Harris, DOD regulations require that ADP systems costing more than $100 million be reviewed by OSD'S Major Automated Information Systems Review Council (MAISRC). Has an OSD review been accomplished for TRADOC's Decision Support System?

Answer. TRADOC Decision Support System costs do not exceed $4 million. Thus the dollar threshold for OSD MAISRC review has not even been approached and none has been scheduled. The Army will have a review of the system before the end of this fiscal year. The $211 million figure is derived from a 1987 field programming

submission and though it may represent the total requirements, the project was not funded anywhere near that level. The current effort is a 2-year prototype costing far less than the requirement shown in the resource programming request.

Question. OSD requires the Army headquarters in the Pentagon to conduct a similar review. When did you conduct one on this $211 million program?

Answer. The program was originally reviewed when the requirement for the prototype was submitted in the Fall of 1988; another review is scheduled prior to the end of FY 1989. These reviews are appropriate for a program of its scope.

Question. Was either an Army or OSD review planned for this system prior to the DOD Inspector General report? When are they now scheduled?

Answer. An Army review was planned to occur at the completion of the 2-year prototype. We have now scheduled an Army review to occur prior to end FY 1989.

Question. For the last 3 years, Congress has had a general provision in law stating: "None of the funds appropriated or made available by this Act may be obligated for acquisition of major automated information systems which have not successfully completed oversight reviews required by Defense Department regulations." Given the DOD IG findings that TRADOC's $211 million Decision Support System "lacks life-cycle management documentation: and the absence of the oversight reviews required by DOD regulations, expenditures to date on this system are illegal. How much have you spent to date on this system?

Answer. The prototype and its preparatory efforts have cost $3.5 million from FY 1987 to FY 1989. The DOD IG findings would be appropriate if the DSS was a $211 million program—they are not appropriate for a $3.5 million, prototype program.

Question. We understand that OSD has made TRADOC Decision Support System an item for mandatory review due to "special interest" by OSD in light of the DOD Inspector General findings. What action have you taken to halt expenditures on this project pending the review in order to conform to the requirements of law?

Answer. During the recent review of the system, acquisition authority delegated to TRADOC was suspended temporarily. Detailed reviews are currently underway to evaluate current and planned expenditures for the effort.

Question. Place any correspondence the Army Pentagon staff sent to TRADOC on this subject in the record at this point.

Answer. A copy of the message to TRADOC follows:

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CALL 697-8840

PENTAGON
OPERATIONS DIRECTORATE

ROUTINE ZYUW RUEADWD4703 1302235
R 102227Z MAY 89 B/
FM DA WASHINGTON DC //SAIS-PP//
TO CDR USAISC FT HUACHUCA AZ //AS-PLN/-OPS/-RM-PB//
CDR TRADOC FT MONROE VA //ATIM/ATRM//

UNCLAS
SUBJECT: TRADOC DECISION SYPPORT SYSTEM (TDSS) PROTOTYPE
(S: 16 JUN 89)
A. SAIS-PP MSG, DTG 081030Z MAY 89, SAB.
1. REF MSG IS RESCINDED.
2. TRADOC IS REQUESTED TO PREPARE FOR A HQDA IN-PROCESS REVIEW DURING 4TH QTR FY89 FOR THE TDSS PROTOTYPE.
3. IN VIEW OF HQDA SUPPORT TO PROCEED WITH THE DEVELOPMENT AND IMPLEMENTATION OF THE TRADOC DSS PROTOTYPE, A POTENTIAL EXISTS FOR THIS EFFORT TO EVOLVE TOWARD AN ARMY-WIDE INITIATIVE. IN ADDITION, RECENT QUERIES ABOUT THE PROGRAM BY OSD AND CONGRESS INDICATE THAT THE PROTOTYPE HAS BROAD INTEREST WITHIN THE DEFENSE DEPARTMENT; THEREFORE, A HQDA IN-PROCESS REVIEW IS CONSIDERED PRUDENT.
4. THE PURPOSE OF THIS REVIEW WILL BE TO DETERMINE WHETHER THE CURRENT PROTOTYPE HAS PROVIDED TRADOC SUFFICIENT INFORMATION TO DETERMINE THE SCOPE OF ANY FOLLOW-ON EFFORT AND DEMONSTRATED VALUE TO THE ARMY IN ORDER FOR TRADOC TO PROCEED WITH A FULL-SCALE DEVELOPMENT EFFORT.
5. DOCUMENTS TO BE PROVIDED FOR THE CURRENT AND FOLLOW-ON CAPABILITY ARE:
A. UPDATED BASELINE (SEE DODI 7920.4)
B. UPDATED LIFE-CYCLE COST ESTIMATE
C. DRAFT MISSION NEEDS STATEMENT (SEE DODD 7920.1)
D. PROPOSED FUNDING STRATEGY
E. ACQUISITION STRATEGY
G. MANAGEMENT CONCEPT
H. FUNCTIONAL DESCRIPTION (OVERVIEW,BOUNDS,INTERFACES)
6. YOUR OFFICE IS REQUESTED TO PROVIDE AN ASSESSMENT OF THE FEASIBILITY OF ACCOMPLISHING THESE TASKS AND A PROPOSED SCHEDULE NLT 16 JUN 1989.
7. POC THIS OFFICE IS C.JERZAK, SAIS-PPS, AV 225-5932, DDN:JERZAK"AT"PENTAGON-OPTI.ARMY.MIL. BT

$$$ SAVE DOLLARS, TIME, & TRAVEL $$$
$$$ VIDEO TELECONFERENCING IS AVAILABLE $$$
$$$ CALL 697-8840 FOR INFORMATION/RESERVATIONS $$$

ACTION SAIS(4) (F)
INFO SCB REVIEW(1)

MCN=89130/39468 TOR=89130/2238Z TAD=89130/2313Z CDSN=MAD734

UNCLASSIFIED

Question. When we look at your ADP budget to Congress, we don't see the $211 million of planned expenditures for TRADOC Decision Support System. General Harris, why is that?

Answer. That is because it is a $3.5 million prototype program, not a $211 million program. The $211 million was a TRADOC request that was not approved at DA level and thus does not appear in the ADP budget forwarded to Congress. The MACOM FY87-89 expenses for the prototype have not been, nor were they intended to occur, at a level which would result in a separate funding or reporting line. There are no dollars in the program for FY 1990-94 and none are to be expended on the effort until the program has been reviewed by the Army.

Question. For the record, provide all funding in the FYDP (direct or indirect) for TRADOC Decision Support System in each fiscal year 1987 to 1994 by appropriation and line item.

Answer. The funding for TDSS is $3.5 million from FY 1987 to FY 1989, it is Army OMA and was in the TRADOC command budget. The expenditures were: FY 1987—$506 thousand; FY 1988—$2.69 million and FY 1989—$321 thousand.

Question. For the record, place a copy of the Army's justification to Congress for this initiative as portrayed in the FY 1990 budget submission.

Answer. The prototype system extends only through FY 1989 and there is no funding which would be represented in the FY 1990 budget submission.

Question. Explain the major discrepancy between the two.

Answer. No funds are to be expended for DSS beyond the prototype and there are no discrepancies between the spending plans and the FY 1990 budget submission.

Question. If you are planning to build a $211 million ADP system at TRADOC, when will you obtain a valid "delegation of procurement authority" from the General Services Administration? Why have you spent funds without doing so?

Answer. If the implementation of TRADOC DSS exceeds the relative thresholds, a DPA would be acquired after an Army or DOD Milestone II MAISRC approval was obtained. Results of the prototype will determine where the effort will go in the future. Current efforts do not warrant obtaining a delegation of procurement authority from the General Services Administration.

Question. Isn't it true that TRADOC Decision Support System as it is currently structured, conforms exactly to the standards which the Deputy Secretary of Defense directed the Army to withdraw in April 1987?

Answer. Except for standardization of the Operating System Software based on the installed equipment, little of what has been done, to date, resembles the rescinded "standards".

Question. The General Services Administration, which oversees all Federal ADP procurement, announced in February 1989 that more Army ADP procurements have been protested formally than those of any other government agency. General Harris, why is that?

Answer. In FY 1988 the Army had 2,873 of the 11,816 acquisitions of ADPE in excess of $25,000 government-wide. The Army's acquisitions account for approximately 24 percent of the total.

In the ADP protest report there are 20 protest decisions listed for Army in the last 2 quarters of FY 1988. The office in the General Services Administration which produces the report has since revised the figure to 18. The total protest for all government agencies were 98. Thus the Army represents 18 percent of total protests.

Because I am not privy to all the reasons that vendors protest acquisition I am not able to determine the reason that more vendors protested Army ADP acquisitions than other government agencies.

Question. In 1988 the Army had 20 formal protests, the Navy 14, and the Air Force 7. Why is the Army so much worse than the other military services?

Answer. The Army is not "so much worse than the other military services." The office of the General Services Administration which produces the ADP Protest Report has revised from 20 to 18 the number of protest decisions rendered in Army procurements during the last 2 quarters of FY 1988. In FY 1988, Army had 2,873 ADP contract actions. This represents 24 percent of the total government wide acquisitions. The 18 protests, out of a total of 98 government wide, represents 18 percent of the total protests. The Navy had a similar percentage of protests based on 14 protests out of 2,488 contract actions.

Question. Isn't is true that the companies which tend to protest are those who wouldn't have had a chance to compete had your official standards been allowed to be published?

Answer. Generally not. A review has been conducted of the 17 firms which filed protests to Army procurements between April 1, 1988, and September 30, 1988. Information was available on eleven (11) of the firms. The review indicated that only one would have been affected. Many of the remaining firms are integrators. As such, these firms would presumably have been able to participate in competitive Army procurements had the standards not been cancelled. It does not appear from the examination of capabilities that the other firms would have been adversely affected.

Question. As head of Army ADP, General Harris, what do statistics like these tell you?

Answer. The statistics show that the Army, with 24 percent of the total contract actions and only 18 percent of the total protests is better than other government agencies. Likewise the three Services represent over 68 percent of total ADP contract actions, yet combined they have fewer than 40 percent of total protests.

I am, however, concerned about these protests and I treat everyone seriously. I will continue to monitor the ADP protest reports to identify ways to improve the Army's ADP procurement process.

O&M READINESS FUNDING

Question. GAO reports that the Army is diverting O&M funds to ADP greatly in excess of what is appropriated for this purpose. For example, Army records show in FY 1987 the Army spent $221 million more than the $1.6 billion appropriated in O&M for ADP, and in FY 1988 it spent $247 million more than the $1.4 billion appropirated. General Harris, why is about a quarter of a billion dollars quietly being funnelled into Army ADP each year?

Answer. A quarter of a billion dollars is not being funnelled into Army ADP each year. The referenced dollar amounts can be traced to the last several Information Technology Systems President's Budgets (ITSB). The $221 million increase in FY 1987 actual obligations was due to a correction in reporting telecommunications resources in the FY 1989 Amended ITSB. This correction was identified in the General Narrative statement which accompanied the budget to Congress and resulted in an additional $176 million reported in O&M for FY 1987. The remaining increase, which is only 2.9% of the original budgeted amount, was a result of normal adjustments during the year of execution.

The FY 1988 increase of $247 million is also partially attributable to the reporting correction in telecommunications resources in the FY 1989 Amended ITSB. This correction increased FY 1988 O&M by $182 million. In addition, in the FY 1990/91 ITSB the Civil Works Revolving Fund (CWRF) appropriation was traced back to the feeding appropriations. Therefore, as described in the General Narrative statement accompanying the ITSB, CWRF no longer appears as a separate appropriation and all feeder appropriations have been increased accordingly. This resulted in an increase of $45 million in FY 1988 O&M appropriation. The remaining increase, which is only 1.4% over the original budgeted amount, is attributable to normal adjustments made during the year of execution.

Question. If you really need these funds, why aren't they properly requested from the Congress in the first place?

Answer. Automation resources are being properly identified to Congress in the ITSB and properly requested in the President's Budget request.

Question. What mechanism do you (as head of Army ADP) use to approve these massive expenditures in advance in the Pentagon?

Answer. Requirement identification and approval starts at the activity level and continues through the installation and Major Command levels for submission and approval at HQDA. The equipment purchased is typically office automation, word processing, or personal computer equipment appropriately purchased as expense items with mission funds. The approval for the actual expenditure of these O&M resources is made at the appropriate level within cost thresholds and within the HQDA approved Information Management Master Plan requirements. Visability of the actual purchase at the HQDA level is based on reports from contract agencies and the MACOMs. The information is reflected in the Information Technology Systems Budget, both in advance, based on projections, and after-the-fact, based on actual expenditures.

Question. We have great trouble getting the Army to spend what is appropriated in O&M for readiness items, particularly depot maintenance. Where does this diverted money come from? Provide a precise audit trail for the record.

Answer. As I have previously stated, the Army is not diverting money from depot maintenance or other programs to ADP. An audit trail of increases in FY 1987 and FY 1988 actual obligations over the original estimates is as follows:

FISCAL YEAR 1987

Initial FY 1987 ITSB	$1,571,669
Telecommunications reporting correction	+176,000
Execution adjustments (2.9%)	+44,931
Fiscal year 1987 in fiscal year 1989 Amended ITSB	1,792,600

FISCAL YEAR 1988

Initial fiscal year 1988 ITSB	1,437,522
Telecommunications reporting correction	+182,000
CWRF identification to feeder appropriations	+45,023
Execution adjustments (1.4%)	+19,742
Fiscal year 1988 in fiscal year 1990/91 ITSB	1,684,000

Question. The computers we are talking about are for administrative purposes, such as personnel, logistics, and finance applications. How can these items have a higher priority to the Army than readiness funds such as depot maintenance?

Answer. The same amount of execution adjustments made during FY 1987 and FY 1988 were made for a variety of reasons, not necessarily to purchase computers. Readiness is always a priority in funding decisions in the Army. Depot maintenance funds have not been used to purchase computers for administrative purposes.

Question. What efforts have you made to cap ADP expenditures to prohibit Army field commands from going "hog wild" in their buying of computers just so that "everyone has one"?

Answer. All ADP equipment request must be validated and approved by the Information Management Officer serving the installation or unit before a contract can be signed. This mechanism insures that every piece of ADP equipment is needed and is not procured so "everybody has one."

YEAR END SPENDING

Question. A February 1989 DOD Inspector General report makes the following observation on Army ADP: "One of the primary concerns of managers at the major command and installation levels was the funding instability that accompanied automation programs. There were numerous complaints that funding was not allocated until late in the fiscal year, which reflected a lack of priority * * * Our analysis of 4 systems substantiates that approximately 75 percent of purchases are made in the fourth quarter, with the majority of them in the last month of the fiscal year." General Harris, why is there so much year end spending associated with Army ADP?

Answer. There are two parts to that answer. One is equipment which is centrally procured under competitive contract arrangement by activities such as the Information Systems Source Selection and Acquisition Agency that does large-scale procurement. We have done several of those kinds of orders within the services in the last few years. When you get into competitive contracting, there are any number of things that can cause you to move a contract award to the end of the fiscal year, depending on when the money was available or how soon we can go on the street with the Request for Proposals.

The second part is that which is procured locally by local commanders using local funds and under authority that we grant them

in accordance with the rules we follow. There can be several reasons that those things go to the end of the line, so to speak. They compete with all other activities on the installation. Whether you are on a training installation, or a logistics installation, or you are a school, you must fund for the training of the soldiers, the pay of personnel, and feed and clothe them; and only late in the fiscal year do you realize that you have enough funds that you can do other things. I don't think that we are guilty of delaying that unnecessarily, and in fact of the computers that were procured in 1988, only about 15 percent of them were brought in the fourth quarter.

Question. How much would you save annually if ADP procurements were conducted prior to the year end spending spree where commanders are motivated to "burn up" the money before it lapses?

Answer. Commanders never receive all the funds they require to support the functions of their installation. They prioritize requirements that they fund during the year. In many instances the procurement of computers with O&M funds is made late in the year when the higher priority readiness or other mission requirements can be determined or projected to be satisfied. Computers, as management enhancing, productivity improving tools are then purchased based on their relative priority. Since most are off-the-shelf and readily available, they can be obtained with funds made available late in the fiscal year. There is no indication that funds would be saved by procuring ADP equipment at any specific time of the fiscal year.

Question. What are you doing to improve the stability of funding for these programs?

Answer. The instability of funding for O&M purchased computers is a direct result of significantly greater requirements than resources, including computers, the relative priority of computers, compared to other mission requirements, and the flexibility afforded senior commanders in the application of resources. While stable funding is desirable, computers should be purchased based on their priority for the function being supported as determined by the local commander.

Question. Now that the DOD IG has pointed this out to you, what guidance have you personally sent to Army field activities?

Answer. I have not provided any guidance to the field on the execution of the Command Operating Budgets (O&M accounts).

Question. What is the percentage of O&M obligations incurred in the fourth quarter of FY 1988 for orders placed against ADP requirements/indefinite quantity contracts?

Answer. Fifteen percent of the total O&M obligations for orders placed against ADP requirements/indefinite quantity contracts were placed in the fourth quarter of FY 1988.

ARMY PAY SYSTEM

Question. The Committee zeroed the Army's request last year to begin a $110 million ADP upgrade for military pay. Subsequently, the Army decided to use the Air Force system rather than invent a new one, and so in conference the Committee restored some fund-

ing. General Harris, it looks like the "good guys" won one. Explain the Army's decision to use the existing Air Force system.

Answer. In 1988 when we were just beginning our full-scale redesign efforts in earnest, we felt the time was right to reevaluate the option of using the Air Force system. Knowing from previous analysis of the Air Force system that we would require compatible hardware, coupled with the fact that we had planned to replace the outdated hardware that our current military pay system runs on, reinforced our decision for this evaluation. Our evaluation showed that we could field the system faster, with less risk and total life-cycle cost.

Question. Why didn't you just do that in the first place?

Answer. During the first two reviews of the Air Force system, documentation was not to the level necessary to allow the Army to adopt their system. This was the opinion of both the Army and Air Force analyst. Furthermore, just prior to those reviews, the Army had just procured new mainframe computers which would have had to be replaced to operate the Air Force system. This scenario had changed when the latest review was completed, as the Army's mainframe computers supporting military pay were scheduled for replacement. Thus additional funds were not required.

Question. How much was spent on the Army unique system since 1976 prior to the Committee's action?

Answer. As mentioned earlier, from 1981 to 1988 the Army spent approximately $33 million on improving the Military Pay system. Investments were for modules which were needed right away and provided the best return on investment. The successful completion of these efforts allowed the Army to realign over 400 spaces from our military pay mission resulting in a 5-year life-cycle savings of over $50 million. The past efforts which include the centralizing of payments for our Academy and ROTC cadets will remain and be integrated with the Air Force systems since these payments are not covered under their central system.

Question. What savings do you estimate as a result of this action?

Answer. Our current Economic Analysis has identified a 10-year life cycle savings of approximately $100 million beginning one year after deployment. The majority of this savings is from MPA cost. This is only an estimate at this time and must be refined and validated after deployment.

ARMY'S PERSONNEL SYSTEM

Question. The Army recently awarded a contract to redesign its military personnel system called SIDPERS–3 (Standard Installation/Division Personnel System). General Harris, what is the value of the SIDPERS–3 contract you just awarded to include the cost of all options?

Provide a detailed breakout for the record by appropriation, fiscal year, and line item.

Answer. The SIDPERS–3 software engineering and development contract was awarded to STATISTICA, Inc., effective 17 April 1989. The contract was awarded for a period of 4 calendar years (encompassing 5 fiscal years) at a value of $42.3 million. The breakout (in $M) per fiscal year is as follows:

	Fiscal year—					Total
	1989	1990	1991	1992	1993	
OMA [1]	5.5	10.2	10.7	10.3	5.6	42.3

[1] Line item for all contract funds is Commercial Services, System Analysis/Programming.

Question. How much could be saved by using the Air Force system rather than building your own unique one?

Answer. Use of the AF military personnel system was previously reviewed; and, at that time it did not meet the SIDPERS–3 MENS requirements. It was decided to allow the Army system to continue to evolve. At this point, in order to bring a new system on board, we would have to scrap everything we have done including the present system in the field. However, we will investigate the AF system as a development alternative.

Question. The Committee understands that the Army received an economic analysis for SIDPERS–3 under a contract from American Management Systems that shows the life-cycle cost of $1.9 billion. Please put it into the record at this point. General Harris, are you aware of such a document?

Answer. The requested Economic Analysis is enclosed. It should be noted that this EA has not been validated and should therefore be considered a draft document.

[CLERK'S NOTE.—The Economic Analysis document was provided for the committee's files.]

Question. OSD requires the Army headquarters in the Pentagon to conduct a similar review. When did you conduct one?

Answer. An Army In Process Review (IPR) was held 14 April 1989. An Army MAISRC II is planned for first quarter FY90.

Question. For the last three years, Congress has had a general provision in law stating: "None of the funds appropriated or made available by this Act may be obligated for acquisition of major automated information systems which have not successfully completed oversight reviews required by Defense Department regulations." Given that the OSD review of SIDPERS has yet to occur, expenditures to date on this system are illegal. How much have you obligated and expended to date on this system?

Answer. The SIDPERS–3 contract was awarded to begin technical design of the system and is within the scope of the Milestone I approval. Development activities of the contract will not begin prior to Milestone II review. Obligations, to date, are approximately $5.5 million and expenditures, to date, are approximately $.8 million. The contractor is developing design alternatives for the development phase of SIDPERS–3. These alternatives will be presented to the Milestone II MAISRC with a recommendation for approval prior to commencement of any development work.

Question. What actions have you taken to halt expenditures on this system until the appropriate OSD review has been conducted, in order to conform to the requirements of law?

Answer. The actions taken to date conform to the requirements of the law. Milestone I was approved by the appropriate approval authority at that time Assistant Secretary of the Army (Financial Management) (ASA–FM). The Assistant Secretary of Defense—Comptroller (ASD–C) guidance requires review of programs at

major Milestones, but does not require that previous Milestone approvals be reapproved by OSD. Future Milestones will be submitted to OSD for approval.

Question. What role did the Under Secretary of the Army have in directing the award of the SIDPERS–3 contract prior to the necessary review by the Office of the Secretary of Defense?

Answer. The Under Secretary of the Army had no role in the award of the SIDPERS–3 contract.

Question. Isn't it true that the SIDPERS–3 contract conforms exactly to the standards that the Deputy Secretary of Defense directed the Army to withdraw in April 1987?

Answer. The contract requires the generic standards outlined by the National Institute of Standards and Technology to include: Structured Query Language (SQL) and Government Open System Interconnection Profile (GOSIP). The contract also requires the DOD standard programming language Ada.

Question. Explain how duplication between SIDPERS–3 and the Reserve Component Automation System will be minimized by the Army ADP community in the SIDPERS contract. What guidance has been provided to the SIDPERS contractor to coordinate with the RCAS program office in advance of incurring costs that may duplicate RCAS functions?

Answer. The National Guard and Reserves have served as partners with the Active Army in the development of SIDPERS–3 requirements. We intend to continue this cooperative relationship to ensure that costs are minimized. To date, all SIDPERS–3 documentation has been provided to PM RCAS to use at his discretion. Further, the requirements for the Reserve Component unique functionality (7 mondules) have been provided to PM RCAS, and will not be developed by the ongoing SIDPERS–3 costs by appropriation, fiscal year, and line item as contained in the AMS economic analysis and compare it to what has been shown to the Congress for justification for the FY90 budget. Explain the apparent major discrepancy.

Question. The SIDPERS–3 costs in the budget comprise a portion of the EA data. However, SIDPERS–3 funding only includes program funding and PM operations. The EA is an analysis of the total costs of the system and includes costs from a number of areas including separately funded hardware and systems costs, i.e. TACCS, ASIMS; thus accounting for the larger numbers shown in the EA. The EA also includes costs for users and operators of the present SIDPERS, i.e. personnel that use the software incidental to their job, such as personnel clerks, that are not normally charged against the cost of the system. For example, the FY90 life cycle cost shown in the EA total $210 million, whereas the SIDPERS–3 software development funding for FY90 is $12.5 million. In any event, the SIDPERS–3 EA will be revised and validated in preparation for the upcoming Milestone II reviews.

VIABLE UPGRADE

Question. The Army has a $1.2 billion 10-year contract to operate five regional data processing centers supporting 47 Army bases and installations in a contract called VIABLE. In April 1989, the Committee's Investigative Staff reported on Army plans to use unexecut-

ed equipment options on the VIABLE contract to upgrade computers not part of the VIABLE system. General Harris, please explain the Army's plan to upgarde "Tier 2 processors" at Army bases using equipment options from the VIABLE contract.

Answer. We do not intend to upgarde Tier 2 processors with the VIABLE contract. That proposal was initiated by the vendor and was not accepted by the Army.

Question. Are we talking about all IBM/IBM-compatible equipment?

Answer. Most of the Tier 2 equipment is IBM/IBM-compatible but there is no effort underway to upgrade this equipment using the VIABLE contract.

Question. The contractor tells us that the cost of the equipment would be between $40 and $80 million. Presumably ultimate costs would be higher when software, personnel, and O&M are considered. Do you consider this a major initiative?

Answer. We are not upgrading this equipment.

Question. The Committee's Investigative Staff reports that the Army had 14 private meetings with the VIABLE contractor. If you truly have a requirement to upgrade these processors, whey don't you do it competitively and have meetings with all contractors?

Answer. Any meetings with EDS would be related to the current contract services, not something outside the confines of the VIABLE, or other Army contract. Such meetings are intended to keep senior officials of both the Army and EDS familiar with the status of the current efforts and to avoid misunderstandings that result from indirect communications.

Question. In an April 11, 1989 fact sheet to the Committee, your office informed us that "if the EDS proposal is determined to be cost and operationally effective, then it will be implemented." Why would you unilaterally take this sole-source action?

Answer. This would be a technology insertion engineering change proposal (One Box Solution). The actual acquisition of the change would be review by Contracting Officers and Legal Counsel prior to commitment to this course of action. Currently this proposal has not demonstrated adquate benefit and the Army has no intention of implementing it.

Question. Where are funds for this requested from Congress?

Answer. We are not going to buy the technical proposal and therefore no funds have been requested for this action.

Question. Isn't true that this initiative conforms exactly to the standards that the Deputy Secretary of Defense directed the Army to withdraw in April 1987 because they were anti-competetive?

Answer. There are many similarities but it did not seem relevant because we do not intend to implement the proposal.

DEFICIENCIES OF THE VIABLE SYSTEM

Question. Let's discuss the Army's main peactime ADP system called VIABLE (Vertical Installation Automation Baseline), which the Army also calls ASIMS (Army Standard Information Management System). The VIABLE contract is $1.2 billion for 10 years. General Harris, what was VIABLE intended to do?

Answer. Although the original estimate for VIABLE was $1.2 billion, the current estimate of the 10-year contract is $733 million. The purpose of VIABLE was to replace obsolete equipment at Base Operating (BASOPS) installations with a modern resource that could stay current. The equipment requirements were based on a specified workload which included Standard Army Management Information Systems (STAMIS), Major Army Command (MACOM) Standard Systems, and installation unique software systems. When the VIABLE project was started, there was a large installed base of equipment at what were called BASOPS Installations. These were primarily installations within the Training and Doctrine Command (TRADOC), Forces Command (FORSCOM), Health Services Command (HSC), and the then Army Communications Command (ACC now the Information Systems Command or ISC). An effort had begun to upgrade the obsolete equipment and GSA directed the Army to combine the efforts and accomplish a competitive A-109 acquisition. The VIABLE contract with EDS is the result of that competitive acquisition. The contract provides for replacement of equipment at the 47 BASOPS installations and there are options for replacement of equipment at 23 additional sites to be selected by the Army.

Question. As we understand it, VIABLE was supposed to consolidate all the Army base-level computers and therefore generate personnel savings. Now that we have a $1.2 billion VIABLE system, are there no longer any base-level computers outside of the VIABLE system?

Answer. The environment was different at that time, but even then it was recognized that there were computers which should not be a part of VIABLE. There are other base level computers and they are there because it was determined that the function could be more effectively accomplished by that solution. The equipment configuration currently referred to as VIABLE was based on a defined set of software systems and the solution provided by a vendor in response to the related acquisition. Other solutions have resulted from other requirements and other acquisitions.

Question. Are you saying we spent $1.2 billion and instead of getting rid of the base-level computers, we actually added more? Where are the alleged savings Army wide?

Answer. The original Life Cycle Cost Estimate for VIABLE was $1.2 billion. However, actual spending has been considerably less. A total of $539 million has been spent through March 1989. The 10-year contract cost is now projected to be $733 million (that would include the $20 million requested in the current reprogramming action.) During this period, mission support manpower was reduced, reporting requirements grew, and the mission became more complex. The Army has been able to do more things of greater complexity with fewer people. There have been cost avoidances accumulated, but savings are not real in a declining budget, you lose the funds before you save them.

Question. Provide for the record the dollars spent and the number of personnel assigned to Army sustaining base ADP activities for each year since 1975.

Answer. Available records provide the following data. Accounting procedures and the period of retention of information precludes

obtaining data prior to 1983. The data is based on the funds expended in the operating accounts for the installations.

	Fiscal year—					
	1983	1984	1985	1986	1987	1988
OMA (millions)	$158.8	187.8	$219.3	$184.5	$231.7	$176.4
CIV (MY)	3,394	3,269	3,110	[2] 2,874	277	262
MIL		([1]*)		(2**)		
OFF				11		
WO				0		
ENL		348		313		

[1] One time extract of military basedon Base Operations structure code.
[2] ISC manpower records for data processing centers.
[3] Civilian manyears were transfered to ISC mission as a part of the Information Mission Area realignment and is not identifiable in the base oeprations.
Manpower records are kept at a different level of account and the requested distribution is not available.

Question. We understand you plan to recompete the VIABLE contract in FY 1992. Why?

Answer. The current contract expires in 1992. As an A–109 acquisition, it should be replaced with an A–109 acquisition. The curent contract has no further growth avaiable, nor does it allow for upgrades to replace obsolete equipment after 1992. There are only a few alternative solutions; i.e., Sole Source Award to EDS for continued operation of the equipment, competitive award for continued operating of the equipment or a competitive acquisition to replace the current contract and address continuing Army requirements. The last alternative is the best for the Army and the alternative which complies with current Congressional and Federal directives. Bidders on the replacement can select to use the installed equipment as the baseline and best use past Army investments.

Question. Explain the "batch" versus "on-line" capabilities of the current VIABLE system?

Answer. VIABLE has both "batch" and "on-line" capabilities. Those capabilities are as modern as any other current technology available from industry.

Question. Are you saying we spent $1.2 billion for technology that was obsolete as soon as it was fielded?

Answer. Again, the dollar figure is approximately $750 million vice $1.2 billion. The issue of "batch" verse "on-line" or "interactive" refers to the software applications used on ASIMS, i.e., the STAMIS. The ASIMS system itself is capable of processing the most modern and advanced applications possible. By 1990–97, over 70 percent of ASIMS usage will be in the on-line, interactive mode. Some processing will remain in the batch mode but this should not be automatically dismissed as obsolete. Some applications do not need, or it is not appropriate to use on-line, interactive capabilities. It would not be prudent or economical to convert to on-line, interactive modes simply because more advanced methods were available.

Question. Your current budget proposes spending over $100 million between FY 1990–94 on "requirements contracts" for large and medium computers and storage devices outside of the VIABLE system, but to do base-level processing. If you are going to recom-

pete VIABLE in FY 1992, why not just compete all base-level ADP requirements like the Air Force did?

Answer. The scope of the recompetition is still being determined. The inclusion or exclusion of the other base level computers will be dependent on the function being performed and where we and industry think automation will be in the 1992–2002 timeframe. Equipment ordered off the requirements contracts are based on an economic or benefits analysis. Such acquisitions would be accomplished if there are adequate benefits to be derived from the acquisition of the equipment. The results of the recompetition will not meet all requirements immediately and good efforts should not be stopped if there is an economic reason to proceed.

Question. Isn't it true that if you limit recompetition to only the VIABLE regional data centers as they currently exist, there is only one vendor (the incumbent) who could realistically participate in such a "competition"?

Answer. Any vendor could take the Government-owned equipment, relocate it and make the connections to the installations. But is not our intent to recompete with the requirement to just mirror what we have today. The recompetition is intended to allow industry to propose different solutions and alternatives in meeting Army requirements.

Question. This vendor tends to frequently bid equipment on a 3-tier architecture that happens to conform exactly to the Army standards that the Deputy Secretary of Defense directed the Army to withdraw since they were anti-competetive, right general?

Answer. This vendor has traditionally stayed in that general environment but that was a corporate decision on his part. The Army has not required solutions that included the rescinded standards. If it is responsive to the requirement and the best cost solution, we are obligated to accept the proposal. With the exception of the vendor specific nature of the rescinded standard, the 3-tier architecture is a common environment found in government and the private sector.

Question. Isn't it true that if the RCAS system is allowed to go forward in an A–109 approach for 4,500 Reserve installations that so many base-level functions will be satisfied with modern technology that perhaps a VIABLE type system might not even be needed in the future for the Army?

Answer. RCAS addresses a whole different set of requirements in locations not normally associated with active Army forces. RCAS will not provide the solution for the requirements or activities addressed in VIABLE.

Question. Does this explain the Army ADP community's resistance to General Temple's RCAS program?

Answer. The Army does not oppose RCAS, we want the Reserve Component to obtain the best solution available and maintain a level of cost effectiveness.

PLANNING

Question. A February DOD Inspector General report makes the following observation about the Army ADP: "We found that the Army information resources planning process does not necessarily

result in optimal solutions to information requirements under the specifications of the Army architecture. First, many mandatory Information Systems Plans are not complete or not updated following changes in the organization structures of Army activities. Second, the majority of IMP initiatives are oriented toward solutions rather than mission deficiencies. Many of the initiatives we reviewed identified specific solutions for requirements, which were sometimes expressed as specific types of systems or vendors. The current situation fosters the acquisition of "desirements" versus requirements." General Harris, describe the Army's ADP planning process.

Answer. The planning cycle begins with the publication of the Information Management Planning Guidance.

The guidance is based on:

Defense Guidance,
The Army Long Range Planning Guidance,
The Army Plan.

The guidance contains:

Army's goals and objectives
Functional Proponents goals and objectives

The planning process is performed in two phases: Phase I. Identification and validation of requirements (Not constrained by resource availability). Phase II. Development of the resource constrained Automated Information Systems (AIS) Strategic Plans (provides the basis for the programming phase of the PPBS process).

Critical Elements of the Planning Process:

Information Requirement Studies—all organizations; all levels, all functional areas
Information Architectures—all organizations; all levels; all functional areas
Information deficiency identification and approval
AIS Strategic Plan—MACOMS; Functional Proponent; Total Army

AIS Strategic Plan Contains:

Organization's mission
Organization's IMA objectives and priorities
Organizations plan for new initiatives and information technology related to its mission
Transition strategy
Assessment of progress made toward accomplishing objectives

Question. We understand these initiatives from Army commands are ultimately approved by you and your staff in the Pentagon. Why do you allow acquisitions that limit competition by specifying specific vendors or their equipment?

Answer. Initiative approval does not equate to acquisition approval. Although initiatives are sometimes solution-oriented, the assigned materiel developer is still responsible to develop a technical solution based on the mission deficiency and within the context of the current target and objective architectures of the MACOM and Army. Through implementation of Federal, DOD and Army regulations, the Army aggressively ensures that all barriers to full and open competition are removed.

Question. Now that DOD–IG has reported that your planning process is deficient, what actions will you take to correct it?

Answer. The Army's planning process is in place as directed by the Paperwork Reduction Act and DOD directive. The DOD–IG report stated that the deficiencies found in the planning process are "contrary to the Information Management Planning Guidance" published by HQDA. We are in the early stages of maturity in our planning process. Continued improvement in the process will require a more rigorous enforcement of our planning guidance.

In the "Supplement to the Information Planning Guidance" (published 13 February 1989), we have further advised MACOMS/ ARSTAF on the development and use of the AIS Strategic Plans for developing their programming documents. Also, we have promulgated the concept that the success of the planning process is not necessarily measured by the amount of additional resources obtained, but by the effective use of available resources to achieve the organization's goals and objectives through the priorities set by the organization in light of its mission.

Question. How much annual savings do you think could be achieved if the Army's $2.5 billion ADP budget benefited from a better, more integrated planning process that allowed more competitive procurement?

Answer. I am quite proud of our record of competitive procurements. Over 80 percent of our ADP acquisitions are competitive. Our acquisition strategy is designed to comply with the Competition In Contracting Act for sole source procurements, but sometimes competition is limited, as permitted by the Federal Information Management Regulations. These exclusions are driven by security, market forces, and cost and are not really a planning process.

Question. The Committee's Investigative Staff reports that the Army's Information Management Master Plan is neither resource constrained nor prioritized. How does the Army determine if the acquisition initiatives within it are cost effective with respect to mission accomplishment?

Answer. The Army's Information Management Master Plan (IMMP) is an integrated list of Army-wide initiatives. The initiatives included in the IMMP are validated at each organizational level for functional and architectural compliance. The functional validity is determined based on information models that describe the business processes (actions, activities, tasks) the organization needs to perform to accomplish its mission.

The AIS Strategic Plans are resource contrained and used at all levels to develop programming documents in the programming phase of the PPBES process. These plans reflect the organization's priorities in light of its mission. The AIS Strategic Plans contain only those requirements that are cost effective and affordable.

Question. If the master plan is not prioritized, how does the programming and budgeting process differentiate between initiatives, and by what criteria?

Answer. The AIS Strategic Plans which are prioritized and resources contrained, are used as input to the programming process to develop the Information Mission Area portion of the Long Range Research, Development, and Acquisition Plan (LRRDAP). The LRRDAP is reprioritized with other functional area initiatives to develop the Army's LRRDAP using criteria identified in The Army Plan (TAP).

Question. Does the Army have a formalized system to monitor the status of approved automation initiatives, including funds expended?

Answer. Life Cycle Management (LCM) of Automated Information Systems is the Army's formalized process. LCM procedures are tailored to project size, LCM is accomplished via * * *

Baselining (need, cost and schedule commitment)

Established life cycle phases (need justification through operations)

Milestone review oversight and evaluation (DOD/Army MAISRC and MACOM/Installation System Review Council (SRC)

Question. What is the Army's policy on the use of O&M versus other procurement funds for the acquisition of ADPE?

Answer. If the items are interconnected, purchased at the same time, and operate together, then we consider it to be a system. If the cost of such a system is excess of $15,000 then procurement funds are to be used.

Question. Explain how the Army will spend approximately $189 million of O&M funds for microcomputers in FY90 with none of them being part of a larger system funded in procurement?

Answer. I cannot track your estimate. Our Information Technology Systems Budget Exhibit 43-series identifies approximately $48 million for O&M purchase of computer hardware.

Question. Surely the need for accurate, timely information is greater in one functional area than another. At what point are Army priorities considered in the acquisition or redesign of ADP?

Answer. Army priorities are determined in the planning process (AIS Strategic Plans and LRRDAP) and refined and matched to available resources during the POM development process.

Question. Does your office conduct on-site reviews and evaluations of field activity ADP projects.

Answer. Our office does not conduct on-site reviews of field activity ADP projects. In the past, we conducted such reviews, but discontinued the practice in 1979/1980, and transferred 15 personnel spaces to the then US. Army Computer Systems Command Inspector General. Rather, we utilize independent team evaluation such as the Army Audit Agency, the DOD–IG, GAO, and HAC S&I. We have found that the utilization of these agencies provides an independent approach, since these agencies are objective, have no reason to be biased, nor can their conclusions be influenced.

My office concentrates on the establishment of policy, procedures, and oversight.

Previously, we have found that it is difficult to provide an independent approach, or the appearance of one for the oversight of projects, when the same staff agency that reviews projects had a hand in making the decisions about the project.

Question. Why haven't they (The On-Site Reviews) prevented or detected the violation of regulations reported by DOD–IG and auditors?

Answer. As previously stated, this headquarters uses On-Site reviews of the Army Audit Agency, DOD–IG, GAO, and HAC S&I to monitor Information Systems Projects. This process is identifying the problems, and providing good recommendations for their solution. The field commands themselves also actively provide reviews.

This is an active process on the part of my office. We work with the Army Audit Agency to determine areas to be audited, we request special audits of problem areas, we suggest special areas that should also be reviewed when the DOD–IG, GAO, or HAC is going to audit a site in order to get the maximum utility from the review. We also take active and affirmative action on employee letters, suggestions, and telephone calls. We also assign a functional monitor to oversee and coordinate efforts with the investigators.

My Policy and Strategy Directorate is responsible for audits and investigations. They are the entry point for all audits. They maintain a complete file of all the things that have been looked at. They have even developed an active on-going data base to detect problem trends so that solutions can be developed as soon as possible.

Question. How does the Army track hardware, software, and communications developments by system to prevent procurement of several different systems for closely related functions and to determine whether costs and benefits of new systems outweigh costs of modifying current systems?

Answer. In Phase I of the planning process (requirements identification and validation), the requirements are validated at all organization levels. DISC4 coordinates all initiatives with DA functional proponents to determine the validity of the requirements, and to see whether a requirement can be satisfied with existing solutions/capabilities. Also, to further eliminate the possibility of multiple solutions being developed to the same problem, DISC4 assigned the general materiel developer responsibility to USAISC for identifying requirements that can be satisfied by a common solution.

As part of the planning process, each organizational level performs a review of currently existing systems to determine whether a given system can be modified to satisfy a given requirement, or deficiency in a cost-effective manner. Our philosophy is not to replace "old" systems because new technology is available, but try to meet our mission in the most cost-effective manner. For Army-wide systems, USAISC as part of an overall investment strategy performs an analysis to determine when to retire a system.

Question. Where does the Army consolidate and integrate information about its current systems into 1 over-arching baseline configuration? Who is responsible for this?

Answer. The Army baseline configuration is documented in the Army Resource and Planning Management System (ARPMIS). It provides the necessary key data to implement configuration management procedures. The Information Systems Command and its subordinate activities are responsible to maintain the integrity of the data base.

MAJOR COMMAND OVERSIGHT

Question. A February 1989 DOD Inspector General report makes the following observation on Army ADP: "The House Appropriations Committee expressed concern about lack of a detailed financial management system in the Army * * * The major commands could not efficiently perform trend analysis; validate excessive fourth quarter spending; nor verify the architectual development, interrelation and integration of major command installation sys-

tems * * * The lack of data to efficiently analyze the cohesive development of the information mission area architecture, efficiency of funds allocation, and effectiveness of other resources decisions affecting the installations places in question the adequacy of major command oversight." General Harris, if your major commands cannot perform effective oversight of their ADP resources, why should we appropriate $2.5 billion to you this year?

Answer. We have an effective oversight procedure in place. The Army's Information Resources Management philosophy is one of centralized direction and decentralized execution of approved initiatives. The draft AR 25-3, Life Cycle Management of Information Systems further re-emphasizes the requirement for tracking assigned initiatives throughout their life cycle. We have developed and are in the process of distributing a software management package for use at installation level for tracking initiatives.

Question. What have you done to address the Committee's concern that you correct this fundamental management deficiency, where major commands cannot tell how much they are spending on given project?

Answer. In the February 1989 Supplement to the 29 January 1988 Information Management Planning Guidance we have directed the MACOMs to track an initiative through its implementation. This requirement applies not only to MACOMs, but below MACOM level.

Question. So far today we have discussed 2 major acquisition problems at the Forces Command, 1 at TRADOC, and 1 with the European command. To what extent do you think these problems can be attributed to lack of fundamental financial management information?

Answer. This is really a basic management issue. The financial aspects are only a symptom of the problem. The question is "How do you encourage innovation and provide flexibility in a decentralized organization like the Army?" The Army's life cycle management procedures are designed to encourage cost effectiveness.

ACQUISITION MANAGEMENT

Question. A January 1989 Army audit summarized the results of Army ADP audits conducted between 1986 and 1988 as follows:

"Overall, Commanders and Army managers should have managed the acquisition of automated systems more effectively. Many longstanding problems reported in the past continued to exist."

"Practices for acquiring automation equipment did not promote maximum competition, and some acquisition procedures restricted competition * * * as a result, Army managers often paid more than necessary for automation resources.

"Life cycle management procedures were not adequately implemented. Economic analyses were not performed * * *"

"Lease versus purchase analyses often were not prepared, updated, accurate, or used to support acquisition decisions * * * as a result, improper acquisition decisions were made and unnecessary costs were incurred."

General Harris, how many people are on your staff to oversee ADP acquisitions?

Answer. In ODISC4 there are 3 people involved on a full time basis. Many of the remaining 150 personnel become involved in specific issues related to acquisition as they impact in their area or program. The Information Systems Selection and Acquisition Activity (ISSAA) is a field operating agency of ODISC4. The primary function of the agency is to execute specific large scale ADP acquisitions. Five people are involved in overseeing large ADPE acquisitions and executing the Army's delegation of procurement authority (DPA) management program. In addition, the Assistant Secretary of the Army for Research Development and Acquisition (SARDA) has one person full time and seven people part time involved in Army ADP acquisition reviews.

Question. Why do many long standing problems reported in the past continue to exist?

Answer. The major problems identified in the past are systemic problems that defy quick and easy solutions and are not easy to implement. We are addressing these problems through policy and procedures, not the least of which is the implementation of a more effective management and oversight process (AR 25-3, Life Cycle Management of Information Systems).

Question. Why do Army managers often pay more than is necessary for automation resources?

Answer. We have re-emphasized competition in guidance, management approvals, acquisition reviews and updated economic analysis. Armywide, over 80% of all ADP acquisitions have been competitive since 1987.

Question. The committee first complained in 1983 about leasing with O&M funds computers that are much cheapter to buy. Why do you still apparently have the problem in 1989?

Answer. We have no uneconomical lease problem in 1989. The buyout of uneconomical leases was completed in February 1988. Based on the audit findings, major commands were directed to review their buyout plans and ensure all remaining uneconomical leases were included and would be bought out by September 1988. Major commands verified their completion of the buyout program at the end of FY 88.

Question. What do you do when you get an audit like this? Doesn't it say your whole process is grossly ineffective?

Answer. We work with the auditors in refining their findings and framing their recommendations to ensure that the recommendations address the real problem. We consider audit findings to be constructive criticism and make every effort to incorporate the recommendations into remedial action. Many of the problems require systemic solutions and, as a result, take longer to resolve. In no case is a finding ignored. External factors over which we have no control sometime enter the picture. For example, the 1986 congressionally directed reorganization executed in 1987 had the effect of delaying the development and implementation of needed policies and procedures due to the adjustments associated with the realignment of functions and organization.

Question. How much of your annual $2.5 billion ADP budget could be saved through more prudent acquisition practices?

Answer. Our record of competitive procurements, Armywide, is actually quite good with over 80% of our ADP acquisitions being

competitive. Our acquisition strategy is designed to comply with the Competition In Contracting Act for sole source procurements, but sometimes we limit competition for compatibility, which is permitted by the Federal Information Management Regulations. These exclusions are driven by security, market forces, and cost, not by lack of acquisition management.

INACCURATE INVENTORY RECORDS

Question. Prior to spending $2.5 billion a year for ADP upgrades, the Army ought to know the inventory of ADP assets that it already possesses. Our Investigative Staff reports that the Army's ADP inventory system—called ARPMIS—"has been and is plagued by a multitude of problems." Further: "Several Army officials have stated that the present database is no more than 50 percent accurate and some installations are still maintaining the old systems. An official at one major command stated that his MACOM has given up on ARPMIS and does not use it. Another official stated that ARPMIS is 'broke and broke full time'." General Harris, why does the Army not have an accurate inventory of its ADP assets?

Answer. The Army will have an 90 percent accurate inventory by September 1989. We are currently undergoing the pain and difficulties of converting from one system to another.

Question. Why is your primary management tool "broke full time"?

Answer. While we have been building the needed tool, no other solution has been available. The ARPMIS is not "broke full time", it is not as free of problems as a mature system and many users had greater expectations than were realistic. The current system is good and is getting better. This has been a minimum cost system and it does not have the "bells and whistles" of an expensive system. Increasing numbers of reporting activities are using ARPMIS and the accuracy of the inventory continues to increase. ARPMIS will get the job done in a cost effective manner.

Question. Is the Army's philosophy: "Forget about what we already have, just buy more, more, more".

Answer. The Army has been and will continue to be frugal with the diminishing resources available to acquire information technology. There is no philosophy in the Army to squander resources. Great efforts are taken with the deployment of each system to make use of assets already available to support information requirements.

Question. What is the percentage of accuracy in ARPMIS for ADP equipment, software, and data transfer?

Answer. Current estimates are that ARPMIS is 70 per cent accurate at this time and it will near the 90 per cent level by September 1989.

Question. What data will the Army use to develop a baseline configuration, and when will it be completed?

Answer. The Army will use ARPMIS which is a continuing effort as assets are acquired and the baseline changes. ARPMIS will support the level of detail and currency appropriate for the level of management using the data.

SOFTWARE MAINTENANCE PROBLEMS

Question. An October 1988 Army audit on the activities by the Army's Information Systems Engineering Command concluded that "the quality assurance program for software developed and maintained by the Engineering Command was not effectively implemented." General Harris, how much is annually spent by the Army's Information Systems Engineering Command? What is its mission?

Answer. The Information Systems Engineering Command (ISEC) spends approximately $120 million to 135 million annually. ISEC is the technical integrator of Information Systems and also has responsibility for the development of Information Systems. This includes software development and maintenance for STAMIS.

Question. Provide a breakout for the record for each fiscal year 1986 to 1990 by appropriation and line item.

Answer.

ISEC BUDGET DATA

[Dollars in millions]

	Fiscal year—				
	1986	1987	1988	1989	1990
OMA	151.9	[1] 234.1	133.6	119.5	121.9
OMAR	1.9	[2] 1.0	0	0	0
R&D	2.0	2.2	2.5	2.2	2.4
OPA	0	0	0	0	

[1] Resources realigned to establish the Program Executive Offices.
[2] Realignment of mission, resource moved to PM RCAS.

Question. Why has this command undergone 5 major reorganizations since 1984?

Answer. The reorganizations are the result of consolidation of the Information Mission Area, the establishment of the Information Systems Command, and manpower reductions. These reorganizations are a progressive effort to implement the changing mission, operating environment, and reductions in manpower.

Question. Why was guidance outlining organizational responsibilities "outdated, unclear, or not followed" as reported by the auditors?

Answer. The Information Mission Area has been a quickly changing environment and we have not been able to keep all of the supporting documentation current.

Question. If the command's products are distributed to the rest of the Army for operational use but have not undergone the necessary quality checks, isn't this a major problem?

Answer. Every effort is being made to insure that the fielded products have been tested and represent a quality product.

Question. The auditor's question a cost-plus $158 million technical support services contract in part because of "inadequately defined requirements" and strongly recommend use of an alternative acquisition strategy that will "transfer the risk of cost overruns to the contractor and substantially reduce costs." What did you do to respond to the auditors findings?

Answer. Development of information systems is a complex task. In many cases, the government must share some of the risk with the private sector in order to obtain participation in the effort. The quality assurance mission is growing and changing. As we expand quality assurance into the earlier stages of Life Cycle Management, we are going into areas where there is little previous experience in government or the private sector. The intent of the effort is to provide a flexible tool which can be adjusted as we gain experience in this area. In response to the audit, we will be using more separately awarded contracts for development efforts.

Question. Provide for the record a breakout of the $158 million contract by appropriation, fiscal year, and line item as it existed prior to the audit and compare it to a similar funding profile for the contract in place today. What changes were made?

Answer. The $158 million figure is the total of four contracts. The contract costs are divided as follows:

Development center	Contract period	Value (millions)
Lee	October 1982–September 1987	[1] $53.1
Lee	October 1987–March 1988	2.9
Lee	March 1988–February 1993	47.2
Washington	February 1986–February 1991	[2] 55.0
Total		158.2

[1] The first contract has been completed and archived. The specific individual task data is not available.
[2] The Ceiling on this contract has been raised since the audit to $81,000,000.

Tasks for Lee Contract #1 ($M):
Ceiling-2.9, Used-2.9 Avail-0

FY 88 OMA	
IFS-M	0.423
AFMIS	0.696
DASPS-E	0.19
DAMMS-MPM	0.329
SARSS-1(I)/SPBS-R	1.005
SARSS-1/2A/2B	0.349
Total	2.992

Tasks for Lee Contract #2 ($M):
Ceiling-47.2, Used-13.175 Avail-34.025

FY 88 OMA	
IFS-M	0.62
AFMIS	0.471
DASPS-E	0.06
DAMMS-MPM	0.349
DAMMS-R	0.362
SARSS-1	0.126
SARSS-2AC	0.151
SARSS-2AD	0.104
SARSS-2B	0.224
SARSS-1(I)	0.077
SARSS-1(I)	0.177
SPBS-R	0.245
SPBS-R-TDA	0.299
CSSCS	0.052
EUSA-Korea	0.227
Total	3.544
FY 89 OMA	
IFS-M	1.562
AFMIS	1.142
DASPS-E	0.265
DAMMS-MPM	0.658
DAMMS-R	1.03
DS4	0.55
SAMS-1/1	0.3
SAMS-1/2	0.496
SAMS-TDA	0.388
SARSS-1	0.265
SARSS-2A	0.871
SARSS-2B	0.395
SARSS-1(I)	0.49
SPBS-R	0.406
SPBS-R-TDA	0.766
CSSCS	0
Total	9.584

Tasks for Washington Contract	($M):
Ceiling-81, Used-52.95, Avail-28.05	
FY 86 OMA	
STANFINS Maint	2.2
DARMS	0.14
STANFINS-R	0.3
Total	2.64
FY 87 OMA	
DARMS	0.2
ACPERS	10.2
STANFINS-R	18.7
SCIPMIS	0.52
SIDPERS 2.5/2.75	0.25
Financial STAMIS Maint	0.2
SIDPERS Ada Plan	0.07
DARMS	0.31
Total	30.45
ABOVE PRIOR TO AUDIT	
FY 87 OMA	
SIDPERS-3	3.3
Micro Based Systems	4.7
SIDPERS DB Development	0.29
Rational Equipment	2.8
MPR	0.47
Total	11.56
FY 88 OMA	
RCAPSS	1.7
DARMS	0.96
Financial STAMIS Maint	0.87
SIDPERS 2.5/2.75 Documenta	0.12
STANFINS Maint	1.7
Total	5.35
FY 89 OMA	
STANFINS Maint	2
Financial STAMIS Maint	0.95
Total	2.95

Glossary

ACPERS	Army Civilian Personnel System
AFMIS	Army Food Management Information System
CSSCS	Combat Service Support Control System
DAMMS-MPM	DA Movements Management System - Movements Planning Module
DAMMS-R	DA Movements Management System - Redesign
DARMS	Developmental Readiness and Mobilization System Maintenance
DASPS-E	DA Standard Port System - Enhanced
DS4	Direct Support Unit Standard Supply System
IFS-M	Integrated Facilities System - Micro/Minicomputer
MPR	Military Payroll Redesign
RCAPSS	Reserve Component Automated Pay System Support
SAMS	Standard Army Maintenance System (Tactical and TDA)
SARSS	Standard Army Retail Supply System - Ver 1-2(Tactical and TDA)
SCIPMIS	Standard Civilian Personnel Management Information System
SIDPER	Standard Installation Division Personnel System Ver 1-3
SPBS-R	Standard Property Book System - Redesign (Tactical and TDA)
STANFINS	Standard Finance System
STANFINS-R	Standard Finance System Redesign

BUDGET DISCLOSURE DEFICIENCIES

Question. The Committee directed a few years ago that DOD include budget justification on large ADP "requirements contracts". These contracts are put in place, sometimes exceeding $1 billion dollars each, to allow many organizations to requisition computer equipment often using their O&M funds. A January 1989 GAO report entitled "ADP Contracts: Army needs to Correct Budget Disclosure Deficiencies" revealed that the Army did not report half of its contracts to the Congress. General Harris, DOD concurred with the GAO findings. What caused the problem?

Answer. The audit you are referring to was on the FY 1989 Amended President's Budget submission. The exhibits provided in the submission, to include requirements contracts, were based on a limited data call. The time allowed for the preparation of the FY 1989 Amended Budget did not permit a more extensive data call.

Question. How useful to the Committee is a document on which half the information is missing?

Answer. In this particular case, we failed to provide information on three requirements contracts, two of which expire in FY 1989. The remaining contract met the reporting threshold in FY 1991 only. However, the total budgeted dollars were included in the other appropriate exhibits of this memorandum budget. In addition, prior to the GAO audit a data call had been sent to the major commands and operating agencies in preparation for the FY 1990/1991 budget submission.

Question. What actions have you taken to ensure this won't be repeated in the future?

Answer. As stated in the audit report, the FY 1990/1991 President's Budget submission includes all requirements contracts the Army uses or plans to use. In addition, we have taken the following action to comply with the two GAO recommendations:

a. Written guidance requiring the routine reporting of the use or planned use of requirements contracts has been sent to all Major Commands and operating agencies as a supplement to the Department of the Army's Information Management Planning Guidance. In addition, guidance for the reporting of the information as part of a command or operating agencies budget submission is included in the Army's Command Operating Budget preparation instructions.

b. I have designated myself as the DISC4 to be the official responsible for oversight of the collection and reporting of the required information.

SOFTWARE REDESIGN

Question. The Army is embarked on an ambitious program to rewrite and upgrade practically all the base-level computer programs in the Army, an extremely complicated and expensive task. These systems are called STAMIS (Standard Army Management Information Systems). General Harris, what is your plan for STAMIS redesign?

Answer. Software life cycle management will determine the redesign requirement. We are maintaining an overview of all the major systems in the STAMIS Modernization (STAMOD) program. The systems not addressed by one of the major functional redesigns will

be considered for modernization within the STAMOD program. Each major STAMIS is redesigned based on the function being supported and the need of the functional proponent to change or modernize the system.

Question. How much is the annual investment cost involved?

Answer. The major STAMIS redesigns or modernizations have cost approximately $100 million per year. A more detailed breakout is provided below.

Question. How much of your current inventory of applications software is written to be dependent on vendor specific hardware or operating software?

Answer. A significant portion is dependent on the Operating system and hardware. The Army also has a significant investment in software which is dependent on the Data Base Management System provided in the ASIMS contract. This software is also hardware or operating system dependent. We are improving portability through use of higher order languages and data base management systems. Most of the problem is related to the fact that software in the past was dependent on the support environment. Most software developments were aimed at the installed base. The Army still has a significant amount of software which was developed before there were real portability tools available.

Question. How much money over what period of time would be required to rewrite or convert these application programs so they are not dependent on vendor specific products?

Answer. The STAMOD program is in the process of making a detailed analysis of this requirement. The detailed analysis will be completed on October 1989 and a plan, including cost, will be available in January 1990.

Question. Describe Army's strategy for moving to an "open" architecture. Does the Army have a systematic plan to transition from its predominantly IBM/IBM compatible systems into a more competitive environment?

Answer. The Army's strategy for transition to an open architecture is to migrate to a generic operating environment as defined by DOD approved standards including: the Government Open Systems Interconnection Profile (GOSIP) for communications, the ADA programming language, the Portable Operating System for Computer Environments (POSIX) for operating system interfaces, and the Structured Query Language (SQL) for Data Base Management System Interface. We have a general plan for implementing that strategy, and are working to fully define all of the details. Our plan is to accomplish that migration in parallel with required system upgrades, replacements or new acquisitions. We also plan to accomplish that migration consistent with the commercial availability of products conforming to those DOD standards. We expect the migration of some of our existing mainframe based systems will require an intermediate step in which existing hardware is upgraded to simultaneously support both proprietary and generic environments for continuity of operations during the period of transition.

Question. How will the Army assure that its major commands systematically adopt open standards as upgrades and new systems are fielded? Who's in charge?

Answer. My office has the overall responsibility for assuring Army compliance. We have issued guidance directing compliance with the emerging DOD-approved generic standards. We conduct compliance review of competitive acquisitions and competition limiting acquisitions above designated life-cycle cost thresholds. We also requested the compliance of other procurements be included as a topic of interest for Army Inspector General and Audit Agency reviews. Moreover, we are actively supporting government and private sector efforts to ensure that commercially available standard products are tailored to the requirements of general purpose automation applications. Our experience with earlier DOD and private sector attempts to establish generic automation standards is that those standards failed to gain acceptance because they were not usable in the general purpose applications which are the principal automation concern of Army MACOM.

Question. For the record, provide the name of each STAMIS in the Army that is planned for modernization, the start and finish dates for such modernization, the total cost of the upgrade to include hardware, and the funding for each fiscal year 89 and 90 by appropriation and line item.

Answer. The software redesign efforts are Army, O&MA funded. The following data is provided:

SYSTEM	BUDGET DATA FY 89	FY 90	PROGRAM COST	START	STOP*
ACAS	3,800	4,100	33,100	05/85	02/89
ACPERS	10,200	13,300	46,400	(MAJOR	CHANGE)
ARPMIS	609	609	1,900	06/86	06/88
AWIS	16,080	19,350	1,065,000	04/84	04/89
DAMMS-R	6,333	6,205	132,000	05/87	08/92
IFS-M	8,125	20,745	44,797	02/86	06/89
MPMIS	1,813	3,890	24,000	01/87	10/89
MPR	10,621	23,583	67,000	07/80	01/91
PBAS	8,862	10,118	53,576	04/83	10/91
SAMS-3	(PROGRAM COST BEING DETERMINED)			05/88	12/91
SAMS-I/TDA	980	738	69,600	01/88	10/91
SARSS	1,894	11,017	298,000	04/81	12/94
SIDPERS-3	7,400	12,500	147,900	01/84	02/91
SPBS-R (TDA)	843	762	51,500	01/89	08/89
STANFINS-R	22,910	25,262	137,427	10/80	01/90
STARCIPS-R	6,426	4,453	36,969	05/80	07/89
STARFIARS-M	2,666	1,795	8,986	12/87	11/91
TAADS-R	1,584	1,830	26,400	04/86	12/89

*STOP date represents fielding, modifications continue after fielding to correct errors and change the system for functional needs.

The systems listed above are the major efforts underway which involve the redesign and modernization of Army standard software (STAMIS). A number of other systems have been identified as requiring modernization but that effort has not been finalized nor is it funded at this time.

The majority of the systems are supported by hardware acquired in the ASIMS, USAFAC Mainframe or a similar central support system. The division of support is determined during the later phase of the system development when the capacity requirements can be determined.

Glossary

ACAS	Army Commissary Automated System
ACPERS	Army Civilian Personnel System
ARPMIS	Automated Resource and Planning Management Information System
AWIS	Army WMMCCS Information System
DAMMS-R	DA Movements Management System - Redesign
IFS-M	Integrated Facilities System - Micro/Minicomputer
MPMIS	Military Police Management Information System
MPR	Military Payroll Redesign
PBAS	Program Budget and Accounting System
SAMS-3	Standard Army Maintenance System -Ver 3 and TDA
SARSS	Standard Army Retail Supply System Multiple Versions
SIDPERS-3	Standard Installation Division Personnel System-3
SPBS-R	Standard Property Book System - Redesign
STANFINS-R	Standard Finance System Redesign
STARCIPS-R	Standard Army Civilian Payroll System Redesign
STARFIARS-M	Standard Army Financial Inventory Accounting Reporting System Modification
TAADS-R	The Army Authorization Document System-Redesign

RESERVE COMPONENT AUTOMATION SYSTEM

Question. The Committee has been struggling for years with the Army to field a basic automation capability to the Army Reserves, who have practically nothing today. This year General Vuono testified "I think we have not had a very good story" while Secretary Marsh testified that this has been going on for 10 years. General Harris, you are head of the Army's ADP community. Why have you failed to deliver a system for the Reserves after 10 years and $50 million?

Answer. The Army has developed many products in its quest to provide a mobilization planning and execution product for the Reserve Component. The development of Continental Army Mobilization System (CAMIS) with Demonstration Army Mobilization System (DARMS) still providing mobilization support to the Reserve Component is only one example.

Question. General Temple's RCAS RFP is scheduled to go out this fall. If your alternate approach were adopted how many of the 19 software systems could be used by industry in the configuration they are in today without further upgrade and modification?

Answer. There are many upgraded products in the Army today. The following systems can be used without modification: Force Accounting System, Integrated Facilities System, Facilities Engineering Equipment Maintenance System, State Accounting Budget Expense Report, Supply Accounting Management Information System, Standard Army Civilian Payroll System, and The Army Authorization Document System.

Question. Explain why you would advocate "hot wiring" the billion dollar RCAS program to run on a particular type of computer rather than a competitively selected computer that General Temple envisions?

Answer. There is no intent to "hot wire" to any type of hardware. We advocate a competitively selected computer as long as it is compatible with the systems it must communicate with.

Question. How does your alternative strategy compare to the original strategy which was rejected by OSD and Congress 2 years ago, in large part because of our Investigative Staff report indicating the active Army's plan to "hot wire" the billion dollar program to just 2 incumbent vendors?

Answer. There is no intent to hot wire. An approach which supports open and unrestricted fair competition is what is needed for this program.

[CLERK'S NOTE.—End of questions submitted for the record.]

WEDNESDAY, MARCH 22, 1989.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, ARMY

WITNESSES

JAY R. SCULLEY, ASSISTANT SECRETARY OF THE ARMY FOR RESEARCH, DEVELOPMENT, AND ACQUISITION, DEPARTMENT OF THE ARMY

LT. GEN. DONALD S. PIHL, MILITARY DEPUTY TO THE ASSISTANT SECRETARY OF THE ARMY FOR RESEARCH, DEVELOPMENT, AND ACQUISITION, DEPARTMENT OF THE ARMY

GEORGE T. SINGLEY, DIRECTOR OF ARMY RESEARCH AND TECHNOLOGY, OFFICE OF THE ASSISTANT SECRETARY OF THE ARMY FOR RESEARCH, DEVELOPMENT, AND ACQUISITION, DEPARTMENT OF THE ARMY

INTRODUCTION

Mr. MURTHA. The committee will come to order.

The Committee is pleased to welcome Dr. Jay R. Sculley, the Assistant Secretary of the Army for Research, Development, and Acquisition and his deputy, Lieutenant General Donald S. Pihl to discuss the Army's fiscal year 1990 budget request of $5.6 billion. They are accompanied by Mr. George Singley, who is the Director for Research and Technology in the Army. Today's hearing is conducted in closed session due to the classified material to be discussed.

We will put your entire testimony in the record Dr. Sculley. If ycu will summarize, we will get right to questions.

SUMMARY STATEMENT OF DR. SCULLEY

Dr. SCULLEY. Thank you very much, Mr. Chairman.

It is a pleasure to appear before the committee. There are only a few points that I would care to make.

In the nearly eight years I have been on board, probably the most significant development in the Army has been the improvement in the quality of the force and there are any number of indicators that show this: the number of high school diploma graduates, the people we have enlisting in the Army in mental categories I, II and III, the steep decline in adverse incident rates to include AWOL, crimes of violence, and other negative indicators such as substance abuse.

Commensurate with that improvement has been a significant modernization that has seen us grow from only a handful of modern helicopters to over 1,700 in today's Army with additions at a rate of some 200 a year; a main battle tank, the Abrams, with funding now having been provided for nearly 7,000; and a Multiple Launch Rocket System with in excess of 30 battery sets fielded.

I would also point out the successful fielding of Pershing II, which I think is the key ingredient in the successful Intermediate Nuclear Forces, INF, agreement.

I say this because the support of the Congress has been key in allowing us to pursue an aggressive research and development program that has resulted in that technological progress in today's weapon systems, despite the fact that fiscal year 1990 marks the fifth year of lack of real growth in the Army budget. It means that we must better manage what has been provided and we have done this with our very comprehensive Army Modernization Plans and the Army Technology Base Master Plan.

I would also say that we will need your continuing support in the future. I think we have a vision for the future that will better focus our research and development efforts and I have with me today the leading military and civilian people in the Department of the Army in Lieutenant General Don Pihl, a person I have had the pleasure of working with over the last eight years and in many different capacities, but most recently, as my military deputy; and the leading civilian, Mr. George Singley, the Director of Research and Technology.

With that, Mr. Chairman, we are prepared to address your questions.

Mr. MURTHA. Thank you very much, Dr. Sculley.

[CLERK'S NOTE.—The joint statement of Dr. J.R. Sculley and Lieutenant General Donald S. Pihl will be printed at the end of this hearing. See page 214. The statement of Dr. Sculley follows:]

STATEMENT OF DR. J. R. SCULLEY

Mr. Chairman, members of the committee: it is a privilege for me to appear before you to present the Fiscal Year 1990 budget request for the Army's Research, Development, Test and Evaluation Program.

Our budget request for Fiscal Year 1990 is for $5.6 billion. This request represents our best effort to focus on research and development projects that promise the greatest potential for improving our warfighting capability and maintaining our scientific and technological competitiveness.

We are all aware that the budget was submitted by the outgoing administration. The Department of Defense is revising the FY 1990 and 1991 Biennial Budget based on new guidelines.

The Army has made steady progress in its equipment posture in the 1980's, and our overriding concern is to maintain that progress as we look forward to the challenges of the 1990's. The need to keep our conventional forces strong has been further amplified by the recent signing of the Intermediate Nuclear Forces (INF) Treaty. Although the INF Treaty is a welcomed action, it poses an additional challenge to the Army to enhance its conventional capabilities and strengthen our position as a globally deployed, strategic force for deterrence.

The qualitative leverage we possess in some equipment areas must offset Warsaw Pact quantitative superiority and unrelenting Soviet technological advances. Our RDA investment efforts of the 1980's have resulted in an Army better equipped to combat the threat across the entire spectrum of conflict; however, the Soviets have also been making steady improvements.

For years, the West has relied upon its technological prowess to meet the military threat posed by numerically superior forces of the Warsaw Pact. Since the late 1970s however, the Warsaw Pact's quantitative advantage has been complemented by qualitative force enhancements.

Research and development by the Soviets is paying off with technological advances which rival, and in some areas may surpass our own. This is particularly true for ground force weapons systems where research and development accounts for a significantly greater share of defense resources in the Soviet Union than it does in the United States.

While the current direction of internal Soviet political debate over the allocation of defense resources is likely to result in lower military procurement levels in the next 2-5 years, perhaps sooner, there is no historical precedent nor evidence to suggest defense R&D in the USSR will suffer. Soviet use of space-based systems to enhance their ground combat capabilities will also provide them better warning, command and control, and synchronization of ground force actions.

Difficult as the Soviet challenge to the U.S. may be, the Army cannot concentrate exclusively on the Soviet threat. Every reasonable forecast envisions continued instability and conflict in the Third World. Opposition forces will have at least a few weapons systems comparable to or better than our own. In some cases, they already possess a full range of modern, sophisticated weapons which are available from the world arms markets or from sponsors such as the Soviet Union.

The Chemical/Biological Warfare threat is not only worldwide, but it is growing and changing in character. The Soviet Union continues to take advantage of emerging technologies in the fields of biotechnology and genetic engineering to develop new agents. These new agents result in the potential for technological surprise that poses unique challenges to our defensive capabilities. As with the conventional threat, we cannot focus just on the Soviet capability. The proliferation of chemical capability throughout the world has grown at an alarming rate. Third World countries view chemicals as a cheap and effective

weapon, as was seen in the Iran/Iraq War. I am sure you have read of other international developments in this arena which give great cause for concern. Today, forces deployed to meet Third World contingencies face great risk.

The Army must continue to vigorously pursue R&D efforts in order to meet the entire spectrum of future threats. Today's rate of technological change is increasing exponentially. As a result, we cannot neglect the future of R&D -- as we did during the Vietnam era, and expect to regain our superiority.

To address this reality in a fiscally and operationally disciplined manner, the Army has developed a framework for our future modernization that includes comprehensive, resource constrained plans in a variety of functional areas. The Army Aviation Modernization Plan (AAMP) presented to Congress last year was the first. Soon to follow are Armor/Anti-Armor (A3), Heavy Force, Fire Support, Air Defense, Truck, Command and Control Modernization Plans and the first Army Technology Base Master Plan.

I would particularly like to emphasize the importance of the Army Technology Base Master Plan, which will provide the technological underpinning for our modernization. This plan, and the investment strategy documented therein, focus and harness our technology base. This plan is due for release next month, and it is my desire and intention to share it with this committee at the earliest possible date. We also intend to provide the plan to Department of Defense contractors to better focus and leverage Independent Research and Development.

As we look to the future, we can be sure of one thing; we will see technology continue to radically change the nature of the battlefield in the same way it has done in the recent past. It has, for example, improved firepower and mobility, target acquisition, battlefield survivability and medical care. Improvements in such technologies as electronics and night vision have greatly increased the individual soldier's sphere of battlefield influence. Other by-products of this technological change include increased information flow during continuous operations over an extended, integrated, highly lethal battlefield.

The Army's Airland Battle Doctrine is an effort to translate the meaning of such continuing technological change into winning battlefield strategy. The Army considers the technology base an indispensable "Corporate Investment" to ensure continued technological superiority of our forces. While private businesses may get a second chance to make up for inadequate "Corporate Investment," we have only to look to history to read numerous accounts of battles lost and armies defeated because they failed to accommodate technological change soon enough.

Often, decisive technological changes have come from unexpected areas, and the well worn phrase "avoiding technological surprise" is inherent in our efforts to sustain our world class research, focus on the critical breakthrough technologies and exploiting focused technology demonstrations to speed the transition of technology out of the labs and into full scale development.

The Army's technology base program is, thus, dedicated to identifying, maturing and transitioning technologies to achieve our vision of a future Army, second to none. The Basic Research (6.1) program exploits science, identifies technological opportunities and maintains a vital link with university and industry research. Our exploratory development (6.2) program evaluates the technical feasibility of advanced concepts. Finally, non-system specific advanced development (6.3A) efforts speed the transition of technology by conducting demonstrations of

advanced technology components, subsystems and systems so that we evaluate technical risk and operational promise prior to full scale development.

This year, the Army has taken important initiatives to focus and strengthen the technology base to increase its quality and contribution to future warfighting capability. Our Technology Base Investment Strategy is documented in the Army Technology Base Master Plan which provides top-down guidance and focus to Army Research and Development activities. Major elements of this strategy include:

-- Meet near-, mid-, and far-term warfighting needs,

-- Reduce the lead-time for introducing new technology into our weapons systems,

-- Retain our leadership in high technology,

-- Identify and exploit key emerging technologies,

-- Leverage other Service, other Government agency, industry, academia, and international investment, and

-- Balance resources among future systems, supporting capabilities, systemic problems, key emerging technologies and basic research.

Success in this overall strategy will ensure we make the right choices and set the right priorities in our research, development, test and evaluation program.

I have with me today my Military Deputy, LTG Don Pihl and my Director of Research and Technology, Mr. George Singley. They will talk to these programs in much greater detail at the conclusion of my remarks.

In closing let me say that our Fiscal Year 1990 budget request represents a balanced program to equip the Army. Our broad-based modernization program, the greatest in peacetime history, is allowing us to provide our soldiers with the quality equipment they need to maintain deterrence and prevail in case of war.

We must continue to buy and allocate our new equipment with sound business sense and solid military rationale. Our major concern is that further reductions and declining economic resources will erode our ability to achieve that goal. It is a business axiom that it is futile to try to merely catch up to a competitor -- you must leap ahead. Our present major procurement programs have achieved a quantum jump in performance capability. As our Army prepares to move into the next decade, our RDA goal is to continue that trend. The main determinant in our ability to succeed in the 1990's is a sound investment strategy supported by adequate and stable funding. Accordingly, we need the continuing strong support of Congress.

I thank you for the opportunity to testify before you today.

EXTENDED COLD WEATHER CLOTHING SYSTEM (ECWCS)

Mr. MURTHA. Dr. Sculley, we appreciate the work that you have done over the years. You are certainly one of the outstanding public servants in the Defense Department and we appreciate very much your dedication to this country.

The Army does research on cold weather gear, don't you?

Dr. SCULLEY. Yes, we do.

Mr. MURTHA. I was out to Yellowstone not long ago and I told Lieutenant Colonel Horner, "bring out the Army cold weather gear because we are going to test it out."

It was a warm day for out there, it was 20 degrees above zero, but I had to change to the Park Department's gear. It was the Gortex.

I don't know if you have different equipment for different temperatures and different circumstances, but this gear—maybe I didn't have the whole set on, but are you using Gortex everyplace now?

Dr. SCULLEY. I don't think that we have bought sufficient quantities so that we are using it everyplace. I, too, have tried the Gortex gear and certainly my only criticism is expense. Not that expense should be the key factor in protecting our soldiers, it shouldn't be. The goal should be a lightweight gear that provides proper protection.

My own personal experience with the Gortex outer garments has been similar. It is lightweight, it provides the best protection I have ever enjoyed.

Mr. MURTHA. My concern is that it is expensive and I hear a rumor that the shelf life is not more than three or four years. For instance, I have some Gortex athletic gear and after three or four years, the water seems to get through it. I don't know what the process is and maybe this isn't the best, but this is expensive, very expensive compared to anything else we buy. It is comfortable if it is not raining, but unless you put an awful lot of clothes under it, it concerns me that we are trying to get by like we did with the uniforms in cold weather. We wear the same uniforms in hot weather and it won't work. Gortex is fine for mild weather, but I can't imagine them using that in real cold weather. Is this the gear you are wearing everyplace?

General PIHL. The initial equipment for the Extended Cold Weather Clothing System was procured for the 10th Mountain Division and for the 6th Division, among others. It is an extended cold weather system and the Gortex is only the shell. Underneath that, you have to wear layers of clothing such as polypropylene and polyester fiberpile underwear provided with the ECWCS. So it is a layering concept.

Mr. MURTHA. Colonel Horner kept it on the whole time and Don Richbourg kept it on all the time. I finally had to put heavy clothing on over top. I didn't have the other equipment underneath.

This has been tested in the Arctic at what temperatures?

General PIHL. Down to minus 60 Fahrenheit.

Mr. MURTHA. So the old parkas and fur around the parkas——

General PIHL. Are being replaced by the ECWCS.

Mr. MURTHA. Is it accurate that it has a three-year life?

General PIHL. I will have to research that.

Mr. MURTHA. Gortex sounds good. The troops seem to like it, but it is expensive. I hope that you will look into it.

[The information follows:]

The Gore-Tex parka that you wore during your recent trip to Yellowstone National Park is but one component of the Extreme Cold Weather Clothing System (ECWCS). The parka by itself provides only the windproof, waterproof, breathable, moisture vapor permeable outer shell for the system. Use of the parka with a combination of natural and synthetic materials defeats its moisture management (wicking) principle. Natural fibers (cotton/wool) trap moisture rather than transferring it to the next outerlayer and reduce the effectiveness of the Gore-Tex parka.

ECWCS is a layered integrated/engineered system designed to be worn in temperatures ranging from 40F to −60F. The material and design of each layer are essential to the moisture management of the system and its ability to keep the soldier warm. The synthetic materials used in the inner insulative layers draw moisture away from the body and into the outer layers of the system, thereby keeping the soldier warm and dry. The following layers comprise the ECWCS system:

Head.—Hood, Balaclava Cap, BDU.

Torso.—Undershirt, Polypropylene (PP) Shirt, Polyester Fiberpile (PF) Parka, PTFE (Gore-Tex) Liner, CW Coat.

Lower Extermities.—Overall, Bib-type, PF Liner, CW Trousers Trousers, CW Trouser, PTFE (Gore-Tex) Drawers, PP.

Feet.—Socks, OG 408 Boots Varpor Barrier (Black or White).

The ECWC system has proven, in test and field use, to be an effective system when layered in accordance with its design characteristics. Our feedback since its initial fielding indicates that it is well received by the soldier. At this point in time very little shelf life/storage data is available for Gore-Tex garments. The chemical component of the Gore-Tex film is inert and should be resistant to deterioration for storage for long periods of time. The materials to which it is laminated for ECWCS also are resistant to aging. Gore-Tex has not been in the Army supply system long enough to gather data to determine any shelf life limitations.

RESEARCH AND DEVELOPMENT, ARMY PRIORITIES

Mr. MURTHA. We have a budget problem and whenever they look at the budget, they always look at research and development, yet that is one of the most important things we can be involved in. Looking at these various projects, which are your real priorities? For instance, LHX, if I remember last year, was a top priority.

To General Vuono, whom I talked to yesterday, I said: "There will be a lot of things this year you are going to want, so how important is it?" When you look at this list, which are your most important programs that the Army needs?

Dr. SCULLEY. I don't mean to give you the stock answer, but, in fact, they are all important and many of the lesser—

Mr. MURTHA. I know they are all important, and I know you have been around a long time, and I know you know how to answer these questions, but we have to have some priority or we are going to be doing it on our own.

Dr. SCULLEY. Certainly the protection of an adequately funded technology base in 6.1 and 6.2 is of exterme importance. The problem with basic research—6.1—and exploratory development—6.2—is two-fold: There is no immediate payoff in funding it and there is no immediate penalty in not funding it, but it is the mortgaging of one's future if it is not funded at an adequate level.

There are many who have accused me through the mail of not adequately protecting technology base efforts and then there are others who ask, on just as sincere a basis, "Why are we spending so much money in 6.1 and 6.2?"

But that investment is the heart and soul of our ability to prevent technological surprise by our adversaries and then to leverage the technological advantages that we have.

Certainly programs such as LHX, the light helicopter experimental are important. Our Advanced Anti-Armor Weapon System-Medium is a very important program.

Our advanced technology transition demonstrators for the nineties, as we look to continuously upgrade our fleet of close combat vehicles, are an extermely important portion of the Army program. We need to continue with the development or our——

LIGHT ARMORED VEHICLES

Mr. MURTHA. Let me interrupt at that point.

As I understand it, when you talk about light weapons, the M-113 is still being used in the army versus the Bradley; isn't that accurate?

Dr. SCULLEY. That is correct.

Mr. MURTHA. They tell me the competition in Europe, for the first time you won the world-wide competition of these light armored vehciles and they use the M113. I was thinking they use the Bradley.

Is it accurate that they use the M113?

General PIHL. You are talking about the cavalry competition?

Mr. MURTHA. Yes.

General PIHL. Sir, I don't know. I know that we won the competition and whether the Cavalry Fighting Vehicle did that or not——

Mr. MURTHA. I have information that it was the M113 you used. That is about a third as expensive as the Bradley. I am just concerned that we are going to these sophisticated systems. When you run a competition that is against all these top-notch outfits, maybe we could have won it even bigger with the Bradley, but this is the first time we have ever won it.

General PIHL. That is right, along with the Canadian Cup and the International Helicopter Championship.

Mr. MURTHA. This is the type of thing that worries use. And also the light versus the heavy equipment

Go ahead with your list. I want to interrupt you at that point.

Dr. SCULLEY. Again, what I will give you are what programs I think are personally important with that earlier caveat. The requirement to upgrade our capability in the program we call Follow-On To Lance, our——

FOLLOW-ON TO LANCE

Mr. MURTHA. Why is the follow-on to the Lance important?

Dr. SCULLEY. The Lance was originally fielded in the 1970s with an expected life of some five years, if I am not mistaken, and has already undergone two service life extensions.

It is an extremely manpower-intensive system. It is not particularly mobile and does not have the ability to reload in the time required for the potential combat we see in the future.

Mr. MURTHA. Any other programs?

Dr. SCULLEY. I think we need——

Mr. MURTHA. We are not going to hold you to this list. I hope you will work closely with the staff as we go along, because there is no question in my mind we are going to have some real problems this year and just from my experience, you will be hit more than anybody else because of the very things you talked about. This committee has been very supportive and tried to make sure that you are adequately funded, but the pressure will be so great on us that we don't know if we can withstand it.

We hope that you and your staff will work closely with the committee staff and we will make sure that we try to get the important programs funded at least.

Dr. SCULLEY. We look forward to what I think has been the continuance of a solid relationship and discussions and briefings regarding Army programs which we found very productive and hope that the staff has also.

Mr. MURTHA. Mr. Sabo?

UNIVERSITY RESEARCH INITIATIVE

Mr. SABO. Thank you.

How much of your money do you spend in the University Research Initiative?

Mr. SINGLEY. It is in the neighborhood of $20 million, sir. I have the exact amount here.

Mr. SABO. Do you have the distribution of where those funds have gone?

Mr. SINGLEY. Yes, sir. For fiscal year 1990, it is $21.9 million; fiscal year 1991 is $22.2 million.

Mr. SABO. What percentages are going to institutions in California, New York, and Massachusetts?

Mr. SINGLEY. We have scaled back our effort in compliance with the geographic dispersion initiative of Congress last year so we are in full compliance with that.

Dr. SCULLEY. We are capped at 14 percent and the two states that were affected were Massachusetts and California.

We are in full compliance and we reduced expenditures to comply.

Mr. SABO. What are the biggest needs you see in the emerging technology?

I am particularly interested in where you see us heading in computing.

Mr. SINGLEY. We now have out on the street, issued as of January, a competitive Request for Proposal for the Center of Excellence called the Army High-Performance Computing Research Center.

We anticipate awarding that contract this fiscal year. The purpose of that center is to establish a Center of Excellence at a university or a consortia of universities that will advance the state-of-the-art, if you will, in high-performance computing research so that we can better leverage the supercomputers that we have on hand and the new one that we are going to be buying this year for the Waterways Experimental Station in Vicksburg, Mississippi.

Mr. SABO. I think in the bill two years ago, we added a requirement that DOD was to report to the Congress on its plans in super-

computing and also as part of that sudy to look to the future, and also interrelate with other Federal agencies to propose what our policy should be on supercomputing.

We still haven't got that report that was asked for two years ago. I am just curious if you have had much—if any—contact from—I am not sure what I should call it—OSD on this issue,

Mr. SINGLEY. Yes, sir; we have. For example, this year, the Office of the Secretary of Defense established a technology-based investment strategy executive review council.

I represent the Army on that and I have counterparts in the Air Force and Navy, DARPA, DNA, and various DOD agencies, and we review investment strategy issues to include the critical technologies report which was sent over last week to Congress.

There is an emphasis in there on computing research.

Mr. SABO. I have not seen that report.

Mr. SINGLEY. That was delivered last week.

I do have with me a copy of the 22 critical technologies as well as a crosswalk between our initiative, the Army's 13 key emerging technologies and those 22 critical technologies.

You will see there is a very good close correlation there. If you would like a copy, I have one with me.

Mr. SABO. I would like one very much.

One of my concerns is that is one of the areas where we are still leading internationally, but we are in danger of losing our lead if we don't keep concentration on it.

Mr. SINGLEY. We are concerned about that also. That is why it is one of our 13 key emerging technologies.

You will also see, for example, there was a recent report on X-ray lithography that we are doing with DARPA, and which has been coordinated with SEMATECH, to improve manufacturing capability in semiconductors.

Mr. SABO. I would hate to see us lose our lead in supercomputing.

Mr. SINGLEY. That is one of the reasons why we have taken the initiative with the Army High-Performance Computing Research Center. The Center of Excellence must not only conduct basic research and applied science. It must also transfer research products out to the Army and industry. That center is to be a center of excellence as I mentioned earlier to improve the application of the supercomputer assets that we have within the Army as well as to train computer scientists and engineers with stipends and fellowships for university graduate students.

Mr. SABO. In the supercomputing area you have some unique security requirements. As I understand it, in most cases people who service these machines are employed by the producer. This could present some unique problems if they are not domestically controlled.

Mr. SINGLEY. Yes, sir.

The Director of the Army High-Performance Computing Research Center has to hold a clearance and although the Center will not be producing classified material, the center personnel will interface with some of our classified work that is being done at BRL, for example.

Mr. SABO. Thank you.

Thank you, Mr. Chairman.

HEAVY FORCE MODERNIZATION

Mr. MURTHA. Let me ask you about your heavy force modernization. I know General Pihl has been involved in that. I have a concern with the money problems and going heavy with the forces we have. Talk about that, if you would, a little bit.

General PIHL. Yes, sir.

We, in looking at the Soviet threat and the continuance of their conventional modernization where they turn out 14,000 tanks in a five-year period to arm the Group of Soviet Forces Germany, have put on the table two sets of block improvements to our very fine M1A1 tank.

The Block II product improvements give us the capability for the tank commander and the gunner to fight independently so that the tank system can kill or service twice as many targets as it can now. It will provide an independence for the tank commander. That is, he can search for targets at the same time the gunner is killing another target with the tank gun.

We will put a modern data bus into the tank. We will put command and control processing into the tank so there will be a visual screen and display for the tank commander and gunner to use.

The M1 Block II tank will put us in good shape because it will arrive in 1992 and will be in the field to the tune of 3,000 tanks. Ten divisions are due in Europe in ten days.

By the time that the Future Soviet Tank 2 arrives ——— we want to get ahead of their modernization so that our first-to-fight forces that are forward deployed in Europe have the most modern tank. Then we will hand back the M1A1 for refurbishment to the forces that arrive in the later arriving force packages.

The same notion goes for the Block III tank in the heavy forces modernization plan. In that case, we are trying to field a third block of improvements to the tank by 1997 so that ——— our first-to-fight forces will already have 3,000 tanks on the plains of Europe ready to go to meet that threat.

The Heavy Force Modernization Plan——

Mr. MURTHA. You are not talking about a new tank?

General PIHL. It could be a new tank. At the present time, we have a competitive formula laid out where we are going to take a new cannon, an auto loader, a new engine, and a new suspension system and put that on to an M1 chassis.

We will look at the integration of those components on an Abrams tank.

Mr. MURTHA. So this comes from the superiority of the Soviet heavy armor?

General PIHL. That is correct.

Mr. MURTHA. You have come to the conclusion we need a new tank?

General PIHL. Yes, sir; I have. The block approach to that with the four components that I just outlined is a solution to the problem. Another solution to the problem is to ask industry competitively to come forward with a design for a new tank.

Now, the reason we call it the Block III tank and the four components——

Mr. MURTHA. Let me make sure I understand. You said new tank. New tank could mean either a brand-new tank——

General PIHL. Correct.

Mr. MURTHA [continuing]. Or it could mean improvement of the existing tank.

General PIHL. That is correct.

Mr. MURTHA. You want to either upgrade the existing tank or start from scratch?

General PIHL. Or come in with a revolutionary design.

The difference, sir, is time. Right now, following the legitimate acquisition regulations, if we were to declare a new start tank for 1997 arrival and we did all of the things that are required in test and evaluation heel to toe, the earliest we could put that tank into the field would be about the turn of the century.

So what we are trying to do——

Mr. MURTHA. How long did it take to develop the M1?

General PIHL. From the time of the main battle tank 70 project until we finally fielded the M1, it was about a 13 year process to get that into the field. We are trying to halve that. Nobody is trying to engage in avoidance of oversight or the number of reviews that this will go through in terms of defense acquisition regulations.

We are only trying to bring into being a thing we call concurrency, avoiding the heel-to-toe nature of development.

Around that Block III tank, as a heavy chassis, we will then put together the concept for an Infantry Fighting Vehicle, a Howitzer and an engineer Combat Mobility Vehicle so that the same common chassis will have all four of the large systems in terms of its base.

Mr. MURTHA. What has changed—what is the increased threat? Is the gun too small, not enough ammunition—what is the difference?

General PIHL. What we want to do is to reduce the presented area of the tank as the enemy sees it so we want them to look at less of a target. So there will be a reduced volume turret in the Block III tank.

Mr. MURTHA. A turret-less tank?

General PIHL. No, a reduced volume, a smaller-sized turret by bringing in an automatic loader and shrinking the size of the capsule that the man serves in.

Mr. MURTHA. So the gun will turn, but you won't need as much volume there because nobody will be inside the turret, is that the idea?

General PIHL. That is essentially correct.

Mr. MURTHA. So essentially you have only a gun in the turret?

General PIHL. Yes, with the displays and processing of data to where the crew can fight buttoned up and they are not exposed to enemy fire.

Mr. MURTHA. How much of the volume is due to the man?

General PIHL. We design to the 95th percentile man. One of the options we face is to size the human being to the tank. So if we design to a smaller individual, say, 5'8" and 160 pounds, like the French and Germans do, we would be able to reduce the amount of turret volume that is presented to the enemy.

Mr. MURTHA. I know I have a hard time getting into the M1 compared to the old tank. It is a squeeze.

Once you are in, you can operate it—you are talking about an even smaller area. In other words, it would be a smaller person ——

General PIHL. The trend is clearly against you and I, sir.

Mr. MURTHA. Can you get inside the driver's seat?

General PIHL. I can. I have driven, shot and commanded an M1 tank and I can do that——

Mr. MURTHA. In your younger days?

General PIHL. Yes, sir.

Mr. MURTHA. You weren't much smaller?

General PIHL. No, sir; I was not.

The four heavy vehicles in a combined armed force, you asked what is different in the threat. In terms of their armor protection and their ability to shoot at us ———. We are trying to provide increased protection for our tank and increased lethality against their tank. So the fundamental part of the Heavy Force Modernization Plan is to work on lethality and survivability.

The Russians don't have the same premium on survivability as we do. Essentially, their tank comes out with more protection around the gun and the fighting components and less attention to the people in terms of their survivability.

Mr. MURTHA. Is this all there is to the heavy modernization? How about the howitzer and the Bradleys?

General PIHL. The Future Infantry Fighting Vehicle, the future Howitzer—Advanced Field Artillery System—and the Counter Mobility Vehicle would have the same common chassis as the Block III tank has.

One of the proposals we have is to do technology demonstrators related to all four of those concept vehicles.

When the program goes through the Defense Acquisition Board and receives its Milestone I approval, that is next fall that we get that permission, each of those programs will then take on a programmatic life of its own.

So, the Howitzer, the infantry vehicle, and the engineer vehicle will stand and fall based on each one going through its own developmental cycle with the chassis being the common denominator.

Mr. MURTHA. With the experience that Dr. Sculley has and the expertise of you folks, this will probably be cheaper than the M1, wouldn't it?

General PIHL. It has to be because we have to ——— get inside the Soviet fielding of their tanks ———.

Mr. MURTHA. All of these improved vehicles being cheaper than—per unit ——

General PIHL. Must be; yes, sir. They will be more expensive than when we do the Block II because that is just an applique.

Mr. MURTHA. Instead of going to smaller men, can we jump over to a robotic-type tank?

General PIHL. Clearly the technology will lead you to that conclusion, but not in time ———.

Mr. MURTHA. One of the big concerns I had about the B–1 and B–2, I said if we build the B–1 we will never build the B–2. I offered an amendment to that effect but we lost the amendment, so I sup-

ported the B–1. I always worry that we will never have the money for the B–2.

With reduced risk as I see it at the time, how much longer would it take to develop this futuristic vehicle?

General PIHL. Presuming, sir, that you are going to capitalize on either electromagnetic or electrothermal technology as the killing mechanism as opposed to a chamber pressure vessel or a tank cannon gun tube, as we call it, you are talking about the years 2002 to 2005, somewhere in that regime.

One of the problems with electromagnetic, EM, and electrothermal, ET, great opportunities for us technologically, is packaging the power supply. We have contractors who have demonstrated the launch mechanism, either electrothermal or electromagnetic in which you generate the force to kill the threat targets, but we have not packaged the power supply to where it will fit inside a vehicle.

Mr. MURTHA. Are we talking about these being more expensive per unit than the M1?

General PIHL. I would assert that a radically designed tank, elevated electrothermal gun, robotically operated or maybe zero men in the crew, at that point in time, unless you decided that it was truly disposable, once it was killed, you would make no attempt to repair it, you are looking at more dollars than you are for a Block III M1.

Mr. MURTHA. How can we guide you in that direction, make sure you have enough money to look at that seriously before you go forward?

What worries me is we will be so far along the line, we have spent so much money in the B–2 R&D, everybody hated to give the B–1 up because we had spent so much money on R&D, although everything has worked out now because the Soviet threat is so much less we could have done that, but at the time I could see the concern.

How can we make sure that we are looking at this realistically and not building one that is obsolete before we put it in the field?

Mr. SINGLEY. Sir, that is in part our thinking behind embracing the advanced technology transition demonstration concept this budget year.

We have laid out our Technology Base Master Plan and we have formulated the Heavy Force Modernization Plan. We have laid out technology demonstrations in support of the Aviation Mod Plan and in support of the Heavy Force Modernization Plan so that we will use 6.3A funded, technology demonstrations to prove out the technological long poles in the tent. That is, we will demonstrate those higher-risk aspects of the technology before we commit to full-scale development of any of these vehicles in the heavy force modernization plan.

In addition to that, we have also laid out in our program throughout the five-year defense plan the leading edge higher-risk high-payoff technologies, particularly in the electric gun technology area.

We are working with industry—in fact, industry is putting up some money in the electrothermal and electromagnetic launch technology.

So, if you will, we have a series of technology demonstrations to prove out the technologies before we go to a full-scale development milestone decision so that we know the costs and technology. We are concurrently looking toward the longer term in terms of proving out and bringing under control risks in the cost of electronic gun technology.

Mr. MURTHA. So you have a gun, but not an engine system that is small enough to fit into the vehicle is that what we are saying?

Mr. SINGLEY. No, sir. If you look at the Block III tank, for example, we have taken a snapshot, a technological snapshot, if you will, at the time when we have to start full-scale development in order to get the Block III tank out ———.

The technical demos that we are doing in the near term, which are in the budget, are to prove out that technology so that we can have a three-man tank crew rather than a four-man crew.

In the far term, we have laid out technology programs, not just in electric gun technology, but we are also working on sensor technology, on advanced survivability measures, automatic target recognition and a lot of technology. We are looking at the more advanced technologies that we have already been working on within the aviation arena, for example.

Mr. MURTHA. So what are we talking about is leaps in technology? Is there any way you can measure the two leaps? We are going from a tank with people in it, to a futuristic tank——

Mr. SINGLEY. Some of the advanced concepts that we are looking at beyond the Block III tank, recognizing that the Block III tank will be a three-man crew, have an advanced tank cannon system with an auto-loader, it will have a conservative, reduced volume propulsion system—recognizing that that is the state-of-the-art, if you will, in the near term. In the far term, beyond that for future generations, we are looking at technology such that we can reduce the crew workload and perhaps go to a two-man tank, to more robotics, if you will——

Mr. MURTHA. You don't see going to no people in the tank in the near future?

Mr. SINGLEY. We are looking further out to where you might have an unmanned armored combat vehicle. That is being done under our robotics program.

Mr. MURTHA. What is the difference in technology here? Are you talking about in the new tank, just an improvement of the old versus the one with no technology—I can't comprehend how much more research we are talking about here.

General PIHL. When we go to the Block II tank, we are going to put better processing command and control into the tank than we have now. We are going to extract from the tank its capability to ensure that we can kill the number of targets that outnumber us on the battlefield.

So, Block II has a 120-millimeter cannon, the same smooth bore gun we have now with better bullets in it, long rod penetrators that have a higher length over diameter and will go through all the Soviet armors that we know about from any angle, including their reactive armor.

Then we will move to Block III, which I would say will maximize gun cannon technology. We are going up to a large caliber gun,

separately loaded ammunition and a longer rod penetrator even than we have in the 120-millimeter caliber. So Block III maximizes the technology of a gun-launched projectile. The leap ahead tank, the radical future design would go to some sort of an electrothermal or electromagnetic launch, a new technology, which would essentially double the force of the kinetic energy in terms of a missile or bullet going down-range.

So it would be a 100 percent increase in terms of megajoules. We are looking for true overmatch capability at that time. We may be able to just knock the turret right off the tank rather than penetrate. That is kind of the step process that we are in right now.

Mr. MURTHA. Mr. Sabo?

ROTARY ENGINE

Mr. SABO. Where does the rotary engine fit into this?

Mr. SINGLEY. The two engines we are looking at now are a diesel engine and a turbine engine. Those are the competitors in the program. Those are the engines that we are currently testing under our test bed.

Mr. MURTHA. How much weight is driven by the size of the engine in these tanks?

General PIHL. Sir, at the present time the M1A1 with the 120mm-gun has grown the tank to 70 tons. The Block III goal is to reduce the tank to 55 tons and a major savings comes from taking out the current 1500 horsepower jet engine and reducing it to a lesser volume engine and turning it on its side. It gives you two chances to reduce weight and allows more compartments to put special armor into for protection.

Mr. MURTHA. We don't have a rotary engine that will work in this vehicle?

Mr. SINGLEY. No, sir. Competition was held for the advanced engines and we ended up selecting the diesel and the turbine.

Mr. MURTHA. Have you even looked at a rotary engine?

Mr. SINGLEY. In the T-800 and in the automotive area and the aerospace area.

ROBOTICS

Mr. SABO. I am curious about robotics and what you see as its future. I forget particular programs as we go along, but I was involved in discussions last year with the other body on a program. They seemed very negative on robotics research, which struck me as being something we should be aggressively pursuing.

Mr. SINGLEY. We have a problem about restrictions placed on us, but not on the Marine Corps, relative to Army robotic vehicles, so our robotics program does not include weapons on unmanned ground vehicles.

But the technology barriers that we are focusing on are command and control, unmanned vehicle navigation, data links, and reconnaissance for robotic vehicles.

Of course, the sensor technology required for this is something that we are working closely with DARPA and with the Marine Corps, because it is an area of mutual interest.

Mr. MURTHA. Restrictions by whom?

Mr. SINGLEY. By Congress.

Mr. MURTHA. We put restrictions——

General PIHL. To put a weapon on a robotic vehicle. We were told to restrict our robotic vehicle work to reconnaissance and surveillance.

Mr. SABO. Generated by the other body?

General PIHL. Yes, sir.

Mr. MURTHA. Staff tells me that in the conference last year, that the Senate wanted to go forward with robotics research and make sure you got the bugs worked out of that before you started working out systems with weapons; does that make sense?

General PIHL. Yes, sir. It is a logical approach as long as you don't have a restriction on weaponizing the unmanned ground vehicles forever.

Mr. MURTHA. What would you recommend we do this year?

General PIHL. Sir, I think you should allow the Army to proceed with a roboticized look at a ground-launched Hellfire system in conjunction with the Marine Corps. I think that would be a good thing to do.

HEAVY FORCE MODERNIZATION

Mr. MURTHA. Let's move on to—staff says you are pursuing a common chassis under the Heavy Force Modernization initiative. What does that mean?

Mr. SINGLEY. The common chassis technology demonstration, sir, involves a competition between two successful bidders to fabricate and to test a chassis design for the four heavy vehicles that General Pihl mentioned.

They are the Block III tank, the Combat Mobility Vehicle, the Advanced Field Artillery System, and the Future Infantry Fighting Vehicle. As we pursue building those four vehicles off of a common chassis, we want to demonstrate that the technology, that the costs and benefits, including the performance that is predicted by the contractors, is in fact achievable. We will do that through the technology demonstration referred to as the Common Chassis Advanced Technology Demonstrator.

We want to have competing demos between two successful bidders. They will design, fabricate and test, sir, their common chassis, which is consistent with their overall design for the Block III tank and for the other vehicles——

Mr. MURTHA. Is that the same thing you did with the truck? You have got a common chassis and you can adapt all these different configurations to your chassis.

Mr. SINGLEY. We have done that more or less de facto in the past. If you look at all the versions, for example, of the M113, we have in the past ended up with a number of variants, if you will, off the basic vehicles.

What we are trying to do at the outset of this program is recognize that there is a significant potential for reducing O&S costs—for example, one objective is to reduce operational and support costs by 30 percent. These savings are possible, through commonality and standardization that one achieves not just at the chassis level, but also at a component level. The standard Army vehicle

electronics architecture, the electronics suite that goes into the tank, is applicable and would be common to other vehicles.

General PIHL. It is similar to what we did in both the ten ton truck and the HMMWV or high mobility multi-purpose wheeled vehicle. There are various types of both of those trucks. In my answer on heavy force modernization, I have given you two-thirds of the answer.

We also have in the medium chassis the Line-Of-Sight Anti-Tank weapon, LOSAT.

We are going to take a kinetic energy missile and put it on top of a Bradley Fighting Vehicle chassis. That will be the vehicle that will replace the Improved TOW Vehicle which is in our dedicated anti-tank companies and infantry battalions. We call that the Line-Of-Sight Anti-Tank vehicle.

The other medium chassis vehicle, using the Bradley, will be a future Armored Resupply Vehicle that will be the companion to the new Howitzer. So the Heavy Force Modernization Plan Package 1 has four heavies on a common chassis and two mediums.

Mr. MURTHA. What about using wheels instead of tracks? For instance, we have a vehicle they call the Dragon Wagon. It looks to me like it would go almost anyplace. That goes over pretty rough terrain. It would be cheaper if we could go to wheels.

Have you looked at that?

Dr. SCULLEY. I have also driven that vehicle at the time it was a candidate for the Marine Corps, literally drove it on the beaches of the Potomac and was impresed with its mobility. It was a derivative of what we have bought in the heavy truck, the HEMTT ten ton. I don't know—I asked then in the Army circles whether or not we have an application for certainly a few of these vehicles. The answer came back negative and I don't know what the Marine Corps ever did with the Dragon Wagon concept.

Mr. MURTHA. For instance, if I remember, it was to carry fuel and move fairly quickly. I don't know what else it would carry, but that was the basic carrier for a faster tank. What do you carry your fuel with now? Do you have trucks that drive along behind?

General PIHL. We use the ten ton heavy equipment transporter fuel version, sir.

Mr. MURTHA. Of course, the Dragon Wagon is probably a lot more expensive, but it can go over a lot rougher terrain.

What about that type of a chassis for your tanks?

General PIHL. We have looked at wheeled combat vehicles. I commanded the Army's motorized division at Fort Lewis, Washington, which was an all-wheeled vehicle division with the fire power of a heavy division using the Tube-Launches, Optically Tracked, Wire Command-Link Guided TOW missile system on a five-quarter-ton truck.

The problem with weaponizing wheeled vehicles in heavy cannon calibers is that they will not absorb the recoil forces that a tracked, large, heavy tank-line vehicle will.

In the Light Armored Vehicle 25 program, once a joint development between the Army and the Marines that went on to be a Marine Corps program, the Marines have experimented with shooting a 105MM cannon off of an 8-by-8-wheeled vehicle. That is at

about the point where the vehicle nearly would not handle the recoil forces when you shoot over the side.

The Belgians' vehicle, called the SIDMASS, is a manned ten ton truck chassis with a 105MM cannon on top, so it is a ten ton truck with a tank turret on top.

Unfortunately, when you get into an armor-on-armor duel, tank versus tank, you can't put on the armor protection in terms of weight to protect the crew. You only have a cannon on top of a truck.

BRADLEY FIGHTING VEHICLE

Mr. MURTHA. What about the Bradley?

General PIHL. That is a fighting vehicle that accompanies the tank into battle. It is a reverse slope defense vehicle. It has a stand-off missile system on top that can only fight from the 3,700-meter line away from the enemy formation. If the tanks come to closure with the Bradley, the Bradley has to back off and go to the flanks or to the rear to fight again.

So the Bradley is an anti-armor vehicle that accompanies the tank formation into battle and provides the infantry security. It is also a fighting vehicle that carries a 25-millimeter cannon and has the TOW missile system in a pod, so you have in the combination there, a dismounting mechanized infantry squad that comes out of the Bradley to fight, and when needed the TOW can thicken the anti-armor defenses and join the tanks in a stand-off situation.

The minute it becomes a tank-to-tank engagement, the Bradley Infantry and the Cavalry Fighting Vehicles fall off to the sides and drop back.

Mr. MURTHA. What about wheels there?

General PIHL. Sir, in terms of a wheeled troop carrier, you have the LAV-25 once again, which is a wheeled vehicle carrier for a squad. You could put a TOW on top of such a vehicle. We decided on a track-laying vehicle in the case of the Bradley in order to have the agility and the mobility to keep up with the tank.

Mr. MURTHA. So the Dragon Wagon would be more expensive—so while it could keep up on almost any terrain, I am sure there is some terrain it couldn't.

I am just wondering wouldn't it be cheaper if we could go to the wheeled vehicle?

General PIHL. I don't know. I would have to study that and do a comparison in terms of armor protection, the ability to mount the TOW, the ability to mount the Bushmaster and the integration of the design.

Mr. MURTHA. Do the Russians have heavier tracks or heavier vehicles?

General PIHL. Tracks. Their compansion piece to the tank is called a BMP and it mounts a 30-millimeter gun and it is a tracked vehicle.

Mr. MURTHA. We should look at that Dragon Wagon and see if we can't get to some wheels.

If you could come to the conclusion that it would be cheaper, because I would think we could develop a wheeled vehicle cheaper

than a tracked vehicle and the maintenance would certainly be less, I would think.

General PIHL. Wheeled vehicles are much easier to maintain than tracked vehicles, sir; no question about that.

Mr. MURTHA. Mr. AuCoin?

ADVANCED ANTI-TANK WEAPON SYSTEM—MEDIUM

Mr. AUCOIN. Thank you, Mr. Chairman.

General, let me ask you some questions about your new AAWS–M program. There are some who I have heard say that we should buy an interim medium anti-tank weapon as what they call a "gap filer" until AAWS–M comes along.

By the way, I think that competition was splendidly conducted and I want to complient the Army for the AAWS–M competition and the work that went into that.

But I am hearing from some who say we should buy an interim medium anti-tank weapon until AAWS–M is in hand. Specifically, I have heard that the European Milan II and Bofors Bill have been mentioned. These aren't Americans systems, of course, but I am more interested not in buy American today, but rather what their capabilities are. Let me ask you, would either of these systems offer a significant schedule advantage over AAWS–M?

General PIHL. No, sir, they would not. Both the Bofors Bill and the Milan II, if we were to buy them for the 18th Airborne Corps, for example, would arrive at about the same time that we are going to start the fielding of the AAWS–M, so I don't see——

Mr. AUCOIN. That is not a gap filler at all?

General PIHL. No, sir, not in my opinion. There are claims that they could make them immediately available, but once we finish putting them through the development, making sure they meet our needs, recognizing we would have to change our fundamental fighting concept to go from an arms room weapon—a one man antiarmor system—to a dedicated crew served weapon, by the time we finished shaking the system out, it is a wash.

Mr. AUCOIN. Are those two systems medium systems in the truest sense, or are they more comparable to say the TOW in the sense of portability in a real life battlefield situation?

General PIHL. Sir, they are clearly medium plus. They are more towards the TOW end of the scale than they are the Dragon. One hundred plus pounds, with four-men needed to carry all of the parts you need, as compared to the 45 pound requirement for AAWS–M.

Mr. AUCOIN. A guy fighting all day with a weight like that is going to feel a real difference between 45 and 90 pounds.

General PIHL. Yes, sir, but I would like to point out in the interest of good relations it is not for me to comment on the in-service use of either the Bofors Bill or Milan, in terms of their countries.

Mr. AUCOIN. I understand. We are just trying to do what is right for the United States. Are these both proven systems or did they have major reliability problems in your tests?

General PIHL. Sir, we have tested both systems and in the case of one, we had an ineffective, operationally unsuitable system; the other system was effective but it did not meet the weight con-

straints that I showed you earlier and it had severe reliability problems, so much so that we had to stop the test.

Mr. AuCoin. Which system was that?

General Pihl. The reliability problems, sir, were with the Bill.

Mr. AuCoin. What about countermeasure resistance? Are these missiles resistant to countermeasures?

General Pihl. Limited capability, sir. Not as good as TOW.

Mr. AuCoin. Can you amplify on that briefly?

The Milan, for example, what makes it subject to countermeasures so readily?

General Pihl. Not in this meeting, sir.

Mr. AuCoin. On balance, how does the probability of kill per shot at, say, a thousand meters of those two systems compare to Dragon II?

General Pihl. Sir, the Dragon II has only an increased warhead and it changes the penetration capability of the basic Dragon system. It is a marginal fix to our inventory weapon system. Its probability of hit and kill does not change. It is only the penetration.

Mr. AuCoin. Is the probability of kill better with the Dragon II than with the Milan II and Bofors Bill?

General Pihl. Sir, the probabilities of hit and kill for the so-called interim candidates are no better than Dragon II.

Dragon II is a bandaid fix that we want to carry only long enough until we get the AAWS–M into inventory.

Mr. AuCoin. What would be the added cost of buying both systems as opposed to product improving the Dragons we have to the Dragon II configuration and going to tank breaker for the AAWS–M, the early test unit?

General Pihl. The cost to equip an expeditionary force is roughtly $180 million, whereas we can fix the warhead for Dragon II for the moneys that are already budgeted.

Mr. AuCoin. Let me ask another thing on AAWS–M.

As you know, the Appropriations report we passed last year directed the Army to include an electronic interlock unless its cost or schedule impact proved to be prohibitive.

I noticed that the Army dropped that requirement from the RFP and it won't be included in the AAWS–M. I suppose that is okay for now, but I really want to stress to you that I don't think this is something that we ought to dismiss casually.

We have already seen problems with Stingers getting into the wrong hands and what they can do with them and we have seen how difficult it is to get those weapons back. We are having those difficulties now, as you know. I don't think we should compound the problem and I see parallels here.

AAWS–M will make a very, very good terrorist weapon. I want to keep it in the hands of our troops shooting at Warsaw Pact tanks, not in the hands of terrorists. I just don't think we can rely on maintaining physical control over all those missiles at all times.

We need to have these missiles as dead weights, it seems to me, until we can tell them to come alive and that is what the purpose of that language was that we put in our bill.

If you incorporated this interlock mechanism that I described in the AAWS–M computer chips as you developed it from the ground

up, you could enable the missile for days or weeks at a time at company or battalion level to be sitting there, the weight penalty would be zero and the cost penalty would be close to zero and the thing is going to be neutral until it is given the go signal by the right people to be used.

Will you look at this again very seriously and get back to the committee on it?

General PIHL. Yes, sir. When we had the three candidates and the three varying technologies we had, of course, a range of block-out devices for each. Now that we are in a selected source with Texas Instruments, we are in serious discussion with them on a lockout device. It could range from a simple permissive active link, a mechanical device all the way through to an electronic chip inside the unit.

[The information follows:]

The Program Manager has had preliminary talks with Texas Instruments, Inc. (the AAWS-M contractor) on lockout devices. They have determined that various lockout devices could be implemented. The devices range from a simple mechanical device to sophisticated electronic devices i.e., a cipher code device for each launch unit, or a device which could electronically enable the weapon system at the direction of a specific code being broadcast via radio or satellite.

Training and Doctrine Command and the Fire Support Program Executive Office are examining feasible solutions and will brief the operational and developmental impacts of implementing the recommended lockout technologies to HQ DA. Based on these briefings, DCSOPS will determine the requirement for lockout devices.

While the Army agrees it would be less costly to add a lockout device during development than after fielding, Texas Instruments is not contractually obligated to incorporate such a device. However, from an operational standpoint, the Army is particularly concerned that some of these devices (excluding spare batteries) may add as much as three pounds to each weapon—a weight increase of nearly ten percent over the weight of each basic weapon.

ISRAELI TANK ROUND

Mr. AUCOIN. Now, I want to return to a point that I raised when the chief was here with General Pihl—I don't remember who else was here.

Two months ago, an Israeli tank battalion commander on the Golan Heights told Bob Sherman on my staff that the 105-millimeter gun and/or the ammunition on his converted tanks had been modified to hit and take out a Soviet tank at 5,000 meters, and he said his crews would use them that way. He implied, although he didn't specifically say so, that it would be effective against targets such as the T-72. This is a guy who expects to go into battle outnumbered 13 to 1 up there, and he either wins, or that is the end of him and his family and home are gone. He is really on the front line up there.

I dont know that he had any reason to exaggerate and I don't believe there is reason to believe he was exaggerating. Do you know about that?

General PIHL. As I discussed with you in the 2 March hearing, we have been evaluating their 3108 Tungsten round. ———. We have essentially validated that in some modeling evaluations we did.

At the same time I testified, sir, I also told you about our ———. I have spent the time between hearings with my program manager for tank main armament systems, Colonel Mullen, and I have a

classified table here which I would be pleased to turn over to you that confirms what I testified to, that we are now at the ———.

It goes back to target acquisition, the role of the human being, the sight, the cannon, and the round. We have now built a round that will ———.

Mr. AUCOIN. And you are absolutely sure the Israelis don't know something that we don't know?

General PIHL. We understand the physics just like they do, length over diameter, and the rod is what determines the kill.

Mr. AUCOIN. Let me just ask you this as a final question on auto loaders.

We have always loaded our tank guns manually because we have noted that other nations' experiences with auto loader—and those experiences have not been particularly good. They have been unreliable and they give you more to go wrong and fewer men to fix it. Now, I understand the Army is planning an auto loader for the M1 Block III. Why is the Army sure that this is a good move, or is the Army sure that it is a good move?

How can you make it work?

Mr. SINGLEY. We are going to demonstrate that. That is one of the things that I referred to earlier in terms of the technology demonstration that we are doing in support of the Block III tank. It is one of the things that we want to make certain as we go through the technology demonstration.

One of the reasons the auto loader is very attractive is it helps us reduce the crew size from four to three, which is a significant factor in terms of manpower.

Mr. AUCOIN. The Army's traditional view has been that these have been unreliable and if something does go wrong, you have one less crew member to help fix it.

What explains the change in the traditional attitude?

General PIHL. We have to shrink the presented area from a target perspective for the tank, reduce the weight from 70 down to 55 tons. In an unconventional design Block III, with a reduced volume turret, the easiest crew function to give up, given the reliability of an auto loader, is the loader.

We believe that the technology is mature enough and ——— and we think a highly reliable auto loader is now possible.

Mr. AUCOIN. Thank you very much.

Thank you, Mr. Chairman.

Mr. MURTHA. Mr. Miller?

AH–64 HELICOPTER

Mr. MILLER. Thank you, Mr. Chairman.

Gentlemen, Sunday's Post newspaper contained an article stating that the Army's $14 million front-line attack helicopters have so many problems that a commander said he would rather take the AH–1 Cobra gunships into battle instead of the newer AH–64 Apaches.

Dr. Sculley—these articles are so misleading sometimes, but could you tell us what was being stated by the commander of Fort Bragg's aviation brigade?

Dr. SCULLEY. Yes, and let me qualify anything that I have to say by saying that the operational availability of systems that we field to our soldiers and leaders is of paramount importance.

The results in that exercise, to my knowledge, in fact, were unsatisfactory, and it represented the performance of some 12 helicopters of the AH–64 variety.

I do not feel, however, after further research since I first read the article on Sunday morning myself, that it is truly representative of the performance we have experienced Army-wide with the AH–64. In the broad sense, there is a required operational availability Army-wide of some 75 percent and we have exceeded that in experience to date with other fielded units at Fort Hood, Texas, and in Germany.

The problems raised by the commander, however, in fact, are real. We have had problems with the 30-millimeter gun, although I disagree that that is the primary system on the AH–64. I personally believe that the Hellfire system is the primary weapon system.

Mr. MILLER. That was jamming of the cannon?

Dr. SCULLEY. That was jamming of the cannon. That is unacceptable and we have had a problem with that. We think we have remedies identified to prevent that from happening in the future.

My disagreement was with the statement that that was the primary system and the AH–64 was useless without it. It fails to identify, I think, the most important armament, the Hellfire missile system. Further, notions to preferring Cobras, I can understand, I think, stem from the commander's frustration.

On the other hand, the Cobras do not have the ability to fight in adverse weather and at night. They don't have the high-hot capability, and just could not perform in many areas of the world with the existing configuration.

Further, they do not have the 30-millimeter gun, nor do they have the Hellfire missile system, so I would argue with the commander, but do understand the frustration he experienced in this exercise. It is of conern.

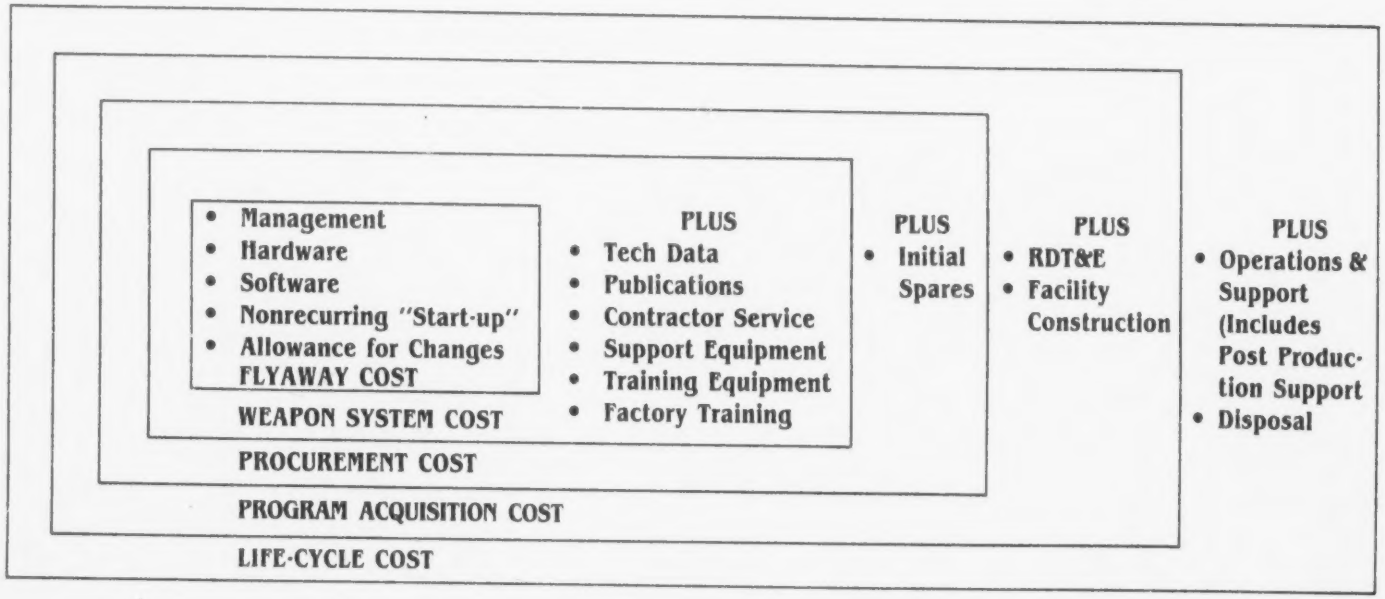
Remedies, I think, are identified. And I would only add the selective, somewhat selective identification of the cost of the AH–64. There are many ways, as you know, to identify the cost of systems, whether it includes research and development, whether it includes the life cycle cost, whether it is the fly-away cost of the system fully equipped, et cetera, and I would be happy to provide for the record all definitions of unit cost and provide them to you personally.

Mr. MILLER. That would be helpful, Dr. Sculley.

[The information follows:]

The following chart explains the components of unit cost.

LIFE-CYCLE COST COMPOSITION



Mr. MILLER. Colonel Kerr's comments are based upon, as I understand it, a five day wargame held in late January, and the comment was that at one time or another, all of the 12 helicopters were incapacitated.

That seems like an extreme statement.

Dr. SCULLEY. Again, that is totally unacceptable, and again, I have not at this point gone into the details to know the reaons why each and every one was grounded, although he did identify some of the reasons, whether it was the absence of appropriate parts or the inability to fix existing problems.

But we literlaly——

Mr. DICKS. Will the gentleman yield to me?

Mr. MILLER. Yes.

Mr. DICKS. The problems were jamming of the cannon, motor burn out, cracked rotor blades, and excessive vibrations that interfered with electronics.

This isn't a good picture, Mr. Sculley. We have been down this road before. I remember sitting here and we went through the same thing. We had a very brave lieutenant colonel who told us all the problems we had with the Bradley.

We listened to General Myers say no, there is nothing wrong with the Bradley. Now we are having the same thing with the helicopter.

What are we doing about it? What is your plan to get these things corrected.

General PIHL. Sir, we have a program right now under Major General Stevenson at the Aviation Systems Command to correct the deficiencies on the helicopter and cut modification work orders in to fix the gun, the ammunition carrier, the shear pins, the circuit breaker, and the main rotor blade in terms of where the debonding occurred. We will do this aggressively and quickly.

Mr. DICKS. Who is going to pay for it? Are there warranties?

General PHIL. Yes, sir with the contractor, and Mr. Bill Brown of the McDonnell Douglas Corporation is actively engaged in fixing these problems.

Mr. MILLER. The excessive vibration that interfered with electronics, that seems to be a big problem.

What is being done at the present time or what is being considered?

Mr. SINGLEY. The AH–64 and the UH–60, of course, were designed to significantly improve vibration levels vis-a-vis the Cobra and the UH–1.

There is work that is going on within the technology base in terms of vibration isolation and some actual techniques that have been applied.

Mr. MILLER. But in the old choppers, we had vibrations, but we did not have vibration to that extent and with the new technology, it would appear that we could design the blades, or whatever the problem may be, so as to have less vibrations.

Mr. SINGLEY. The vibration in the AH–1 and UH–1 was worse than what you have in the Black Hawk and what you have in the Apache.

Mr. MILLER. How much is requested for continued R&D in fiscal year 1990 on the AH–64s and the UH–60s?

General PIHL. Sir, the R&D budget for Apache in 1990 is $84.3 million. That is a multi-stage improvement program.

For the Black Hawk, the Black Hawk request in 1990, sir, is for $26.2 million RDT&E.

AIRBORNE ADVERSE WEATHER WEAPONS SYSTEM

Mr. MILLER. What is the status of the airborne adverse weather weapon system, the new radar for AH-64 and the LHX?

Mr. SINGLEY. It is currently in proof of principle, sir.

General PIHL. Sir, the Airborne Adverse Weather Weapons System is in development for an anti-armor weapons system capable of being deployed day or night. Essentially, it makes the Hellfire system a fire-and-forget missile. Initially, it will be applied to the Apache and then we have the task of downsizing it into a smaller package so it can be fitted onto the LHX.

PERSHING II

Mr. MILLER. I have another question also concerning—and I guess, Dr. Sculley, this was in your statement where you mention that the most successful weapon ever fielded by the U.S. Army is the Pershing II, with its dramatically enhanced accuracy and range.

Now, under the INF Treaty we are pulling out Pershing II; correct?

Dr. SCULLEY. That is correct.

Mr. MILLER. Can you tell us what is being done with those Pershing II's at the present time? Are they being destroyed under the treaty? Are we allowed to keep some under the treaty?

Dr. SCULLEY. We are in full compliance with the terms of the treaty and, in fact, launchers and missiles are being dismantled, rocket motors burned and destroyed, again in full compliance. Similarly, our own inspection teams have verified that the Soviets are in compliance with those same terms of the treaty.

Mr. MILLER. It is possible that the Soviets would have the assembly lines so that they could rebuild and resupply.

Are we in a position with tooling for the Pershing II if we needed it, we would be able to produce it?

Dr. SCULLEY. Not immediately, and I would be happy to provide the details of that for the record.

But, in fact, visits to the contractor sites and inspections are part of the treaty compliance.

Mr. MILLER. But they are available, not destroyed—that is, the sites to produce the Pershing II are available?

Dr. SCULLEY. Again, I will provide that for the record to be accurate.

[The information follows:]

The Pershing production sites were not required to be destroyed under the terms of the INF Treaty. Certain Pershing II production sites which produced critical Pershing II components such as rocket motors and launchers are now declared inspection sites. The Pershing II rocket motor production site at Magna, Utah was declared a portal monitoring site manned by a full time resident team of Soviet inspectors for a period of 13 years, with over 12 remaining.

Mr. MILLER. Very good.

Thank you, Mr. Chairman.

Mr. MURTHA. Mr. Dicks?

AH--64 APACHE HELICOPTER

Mr. DICKS. Thank you, Mr. Chairman.

What is the current meantime between failure for the Apache and how has it performed in other wargames?

Dr. SCULLEY. I would be happy to provide that in detail.

I did allow that our world-wide experience on operational availability, which is one way of measurement of reliability, has exceeded the contractual requirement of 75 percent, but again, I will be happy to provide you any information that is available to me on its performance.

[The information follows:]

The twelve fielded AH-64 battalions averaged a mission capable availablity of 75.2% against a requirement of 75.0% from February 1988 through January 1989.

Mr. DICKS. General, do you know what it is?

General PIHL. Sir, I don't have those statistics with me today.

Dr. SCULLEY. Worldwide, the figure that was given me was 75.2 percent on operational availability against a contract requirement of 75 percent.

IMPROVED RECOVERY VEHICLE

Mr. DICKS. As I understand it, the Army is in the process of taking delivery of vehicles from BMY for reliability and maintainability—RAM—testing. Is this correct, and how long do you anticipate it will take until such tests are completed?

This is the improved recovery vehicle.

General PIHL. Yes, sir, that is correct. The five vehicles that were prototyped to go through RAM testing will go through a 7,000-mile test at Fort Knox, and we are proceeding with the plans for that test activity.

Mr. DICKS. How long will it take?

General PIHL. Sir, between now and October to run the test. To support a decision for production in the December-January time frame.

Mr. DICKS. Will you have a pretty good feel on whether the previous deficiencies have been corrected within the first six months of this testing?

General PIHL. Yes, sir, we will, both with the winch and with the transmission.

Mr. DICKS. I understand that they have already shown various fixes, is that correct?

General PIHL. That is correct. They have demonstrated the winch to our satisfaction for further technical and operational testing, and when we do the mileage tests, we will know about the transmission.

Mr. DICKS. What is the current plan for timing of the advance procurement funds for this program? Will it occur during RAM testing, after it, or only after operational testing is completed?

General PIHL. At the present time, the $24 million long lead is still on hold by the Army Acquisition Executive, and we are in negotiations with the contractor. Right now, I don't know when it will occur.

Mr. DICKS. Under Secretary Stone, in a letter to the editor of Defense Week on February 23, 1989, stated Congressional report language authorizes the Army to purchase long lead items for the recovery vehicle prior to the award of a production contract.

However, because of the need to proceed in the careful and deliberate manner outlined above, the Army has not chosen to take advantage of the contracting flexibility authorized by Congress.

Does this continue to be the Army and DOD position?

General PIHL. Yes, sir, that continues to be Mr. Stone's position, as the Army Acquisition Executive. The DOD position as we are going through the revision of the budget is unknown.

Mr. DICKS. I have heard this story about three different ways. First, we heard that we just can't do anything because DOD has to issue a report and there isn't any flexibility.

Then I argued very strongly that there was flexibility and the Defense Week says that the Under Secretary, who was advocating the prior position now is with Dicks on the latter position.

Are we going to stay with that one, or is it going to shift again?

General PIHL. We still at the time do not have the certification required by the Appropriation Committees to go forward with the production in terms of the certification that we picked the best vehicle. We are working to get Defense to establish that certification and transmit it up here.

Mr. DICKS. What analysis have you given to the impact of this current plan on the ability to hold the contracting team together and maintain the integrity of the contract price?

General PIHL. There is no question but that if we don't go forward with the long lead award, it will be very difficult for BMY to keep their team together.

LHX HELICOPTER

Mr. DICKS. In December, GAO published an audit on the LHX program entitled "Risks Facing the Program Raise Doubts About the Army's Acquisition Strategy." The fiscal year 1990 R&D request is $292 million.

General Pihl, GAO says that the Army currently estimates the empty weight of LHX to be 8,000 pounds compared to the 7,500 pound goal. This excludes the weight of planned improvements and tactical "kits". Is there a weight problem?

General PIHL. Sir, in my opinion, there is not. We have stated 7,500 pounds as the empty weight goal for LHX. The engineers for both contractor teams in terms of their design goals would like to have another 800 to 1,000 pounds, but we are not prepared to give that to them, because they will design to it. So, we are holding a hard line at 7,500 pounds empty weight.

Mr. DICKS. Explain the concept of tactical kits.

Mr. SINGLEY. The concept there, sir, is that it has been normal aeronautical practice and design from a weight standpoint to account separately for the tactical kits. In a modern combat rotor craft, you have items which are kitted that tend to be mission peculiar to tend to be geographic location or deployment peculiar.

There are several examples—you might have, for example, kitting for severe weather conditions, et cetera.

Mr. DICKS. What items are in such kits?

Mr. SINGLEY. Examples of kits are like de-icing systems for cold weather operations, chemical filters, detectors, you may have a remote chemical detector on board, survivability equipment tailored to a specific threat, auxiliary fuel tanks and specialized bearings for missions.

Mr. DICKS. Are armored kits included? Would Army units use bolt-on armored kits?

Mr. SINGLEY. We are looking at the concept of modularity as far as the armor. For example, would you want to fly around in peacetime operations with your full armor suite on board and pay the penalty in terms of weight and fuel consumption?

If you are in a high-intensity conflict, as opposed to low, you might require heavier armor protection or blast barriers between the crew members.

In a low-intensity conflict, you wouldn't carry that higher-threat protection level. This is not dissimilar to the way we first deployed armor kits in Vietnam.

Mr. DICKS. Wouldn't the additional weight of various kits adversely affect the helicopter's performance, which would be predicated on the empty weight goal?

Mr. SINGLEY. No, sir. Because one of the cardinal points of the LHX program was to challenge industry and allow them some freedom in terms of design, but to hold the limit in terms of cost and the weight of the vehicle. The engine has been designed from the beginning with excess power to accommodate adding the kits.

Mr. DICKS. Are the kits included in the weight judgment?

Mr. SINGLEY. The tactical kits that you are referring to are not included in the empty goal, in the 7500 pounds. However, you don't just design a rotor craft with simply the empty weight, you have to design it for maximum takeoff gross weight.

Mr. DICKS. The Packard Commission recommended use of prototypes. In the LHX program, however, the Army will not build a prototype until after the paper competition has been concluded.

What are your views on the need for prototypes prior to the "down-select" decision?

Mr. SINGLEY. The Packard Commission, of course, recommended prototyping so that we could fly before we buy and understand the cost, as Mr. Packard has pointed out recently. In the case of the LHX, there have been a number of technology demonstrations that preceded this program, which if you take the sum of the technologies that have been proven, and you take what is being worked currently under the demonstration validation program, and if you take the full-scale flight simulation, for example, that we are going through, using what has been a rapidly advancing technology in the area of simulation technology and wind tunnel technology, we feel that we will have demonstrated the risk so that the risk is moderate or below, and therefore are in a position to start full-scale development, which, after all, will have prototypes.

Mr. DICKS. Did you build a prototype on the Apache?

Mr. SINGLEY. Yes. We had a Phase I and a Phase II program.

Mr. DICKS. So, obviously, that is no secret to success, either.

GAO offers some alternatives, such as competitive prototyping of the key mission equipment like avionics, or delaying the full-scale

development decision until prototype mission equipment is demonstrated. What is your reaction?

Mr. SINGLEY. We have from the very beginning in the first risk reduction program and now on the demonstration and validation program, we have been doing demonstrations of key mission equipment package items, for example the VHSIC processor, the software algorithms used in sensor technology, and the cockpit display technology.

We feel that when we finish the demonstration and validation program and proceed to full-scale development, we will be able to take into the necessary milestone decision review the demonstration of the technology that is needed.

Mr. DICKS. GAO reports that the Army is currently estimating the unit cost at $8.2 million each versus the $7.5 million goal. How do you plan to meet the cost goals?

Mr. SINGLEY. The program executive officer has provided a performance-oriented RFP and a systems specification to support the RFP that allows the contractors to make the necessary tradeoffs to hit the 7500-pound weight objective for empty weight.

Obviously, they have to bring in their tradeoffs as to what the 7500-pound flying machine looks like, and that will be part of the evaluation process. We won't do something dumb. If it is 7502 pounds, all that will be taken into consideration.

Mr. DICKS. GAO reports that "recent procurement funding projections do not provide enough procurement money to produce the LHX at planned rates." What funding shortfalls exist in your current five year plan?

General PIHL. Sir, in the five year plan, we are still in research and development. The shortfalls that they have picked up in terms of the profiles start to occur in 1997, 1998, 1999 and the year 2000. We have several budget cycles yet to go to adjust those numbers.

Mr. DICKS. When you get the revised Bush budget, put some numbers in for that.

[The information follows:]

There are no procurement shortfalls for LHX in our current five year plan. The GAO was referencing a preliminary planning budget beyond the five year plan, not approved budget. It is our intent to fully fund the LHX program throughout its life cycle. We will provide out year funding projections when available.

JOINT AVIONICS

Mr. DICKS. The fiscal year 1989 Appropriations Act requires that "the designs of the Army LHX helicopter, the Navy Advanced Tactical Aircraft, and the Air Force Advanced Tactical Fighter must incorporate Joint Integrated Avionics Working Group standard avionics specifications no later than 1998."

What is the Army doing in LHX to meet Congressional "joint avionics" requirements?

Mr. SINGLEY. We have been working very close from the outset with the Joint Integrated Avionics Working Group, and the JIAIWG technology is being included into the LHX, and both the Air Force and the Army are incorporating that technology as the report shows into both the ATF and the LHX.

Mr. DICKS. How will the $292 million requested in 1990 be used?

[The information follows:]

A break out of the FY 1990 RDT&E request for LHX is as follows:

[Fiscal year 1990, in millions of dollars]

Dem/Val contracts with competing teams:	
Airframe	47.1
Mission equipment	164.8
Integrated logistics	8.1
Total	220.0
Other contract and lab support	16.3
Program office operations	4.4
LHX/MEP total	240.7
T800 engine	51.7
LHX program total	292.4

Mr. DICKS. For the record, break out fiscal year 1989 and fiscal year 1990 funding for LHX airframe and propulsion lines in detail, showing how the budgeted amounts relate to contracts at target and explaining the differences.

[The information follows:]

RDT&E funding for the LHX program in FY 1989 and FY 1990 is broken out below. Budgeted amounts and negotiated contract amounts for the Demonstration/Validation Phase (FY 1989 and FY 1990) of the program are identical.

[In millions of dollars]

	Fiscal year—	
	1989	1990
Dem/Val contracts with competing teams:		
Airframe	23.5	47.1
Mission equipment	81.7	164.8
Integrated logistics	3.9	8.1
Total	109.1	220.0
Other contracts and lab support	11.3	16.3
Program office operations	3.5	4.4
LHX/MEP total	123.9	240.7
T800 engine	55.4	51.7
LHX program total	179.3	292.4

ANTI-SATELLITE PROGRAM

Mr. DICKS. Tell me, what are you doing on the ASAT program?

General PIHL. Sir, the Army's anti-satellite involvement starts with our technology which is derived from the SDI program. We have at Huntsville, under the command of Lieutenant General Hammond, the Army Strategic Defense Command, and they have developed a technology in the kinetic energy kill field that can be applied to development of a KE ASAT system.

The Army will be the interim lead service for the kinetic energy intercept capability in ASAT. Even though the Army is managing the most promising laser technology, the lead service for a directed energy capability for ASAT is to be determined.

Mr. DICKS. That is lasers?

General PIHL. Yes, sir.

Mr. DICKS. It is a joint program, though; isn't that correct?

General PIHL. That is correct.

Mr. DICKS. Tell us how this is going to work, where the money is going to come from. The money is in the Navy budget——

General PIHL. That is correct. At the time we were going through the Defense Review Board for ASAT, the Deputy Secretary of Defense put the money in the Navy line as a holder until we sorted out lead service and separated the technology and development decision from the deployment decision, which is about a year away.

Since that time, a subsequent decision memorandum has been signed, and as we adjust the budget, the money will be transferred from the Navy to the Army, if the DRB so directs.

Mr. DICKS. Will you be involved in land-based interceptors? Would they be CONUS-based or could they be sea-based?

General PIHL. We have the ability to provide coverage with the land-based missile system for about a battalion's worth of force structure to give us the kinetic energy ———. There is a land-based, a sea-based, and a combined solution, but the basing decision has not yet been made.

Mr. DICKS. You are saying they could not get all ASAT targets, just the low-flying ones?

General PIHL. That is correct; you cannot hit Soviet satellites beyond low earth orbit at this time. This is a conventional system that is designed to take out their tactical eyes and ears and their photo-reconnaissance capability to protect our ships and our land forces.

Mr. DICKS. How would the Air Force's defunct F-15 miniature homing vehicle technology be involved?

General PIHL. It would not. That is a concluded program.

Mr. DICKS. Would your system have to be tested against an object in space in order to be effective?

General PIHL. Yes, sir.

Mr. DICKS. That means you have a problem with the Congressional prohibition?

General PIHL. That is correct.

Mr. DICKS. Are you asking that that be removed?

General PIHL. We understand that was voted down in terms of a permanent prohibition, and at the present time, we could proceed. But it will have to be a treaty-compliant ASAT, and we understand that.

Mr. DICKS. Is the Army requesting any other funds in fiscal year 1990 for any type of ASAT research, development or testing, either lasers of kinetic kill vehicle weapons?

General PIHL. There is the upgrade of the Free Electron Laser out at White Sands Missile Range, and there is a related piece as far as management of the activity is concerned. We do not see a need for additional KE funding at this time.

Mr. DICKS. When would you do your test against an object in space?

General PIHL. Sir, well into the program. Between now and 1996, we would have to first build the system and——

Mr. DICKS. Not in fiscal year 1990?

General PIHL. No, sir.

FOLLOW-ON TO LANCE

Mr. DICKS. Tell us about the Lance follow-on. The Army budget proposes beginning a $1 billion program to replace the Army's nuclear capable Lance missile for NATO, which is obsolete. Lance is used to support the European theater.

What is your requirement to replace the Lance missile?

Dr. SCULLEY. The requirement for the Follow-On To Lance calls for the development of a nuclear missile capable of being fired from an MLRS-like launcher with a range of 450 kilometers required, 490 kilometers desired, with improved accuracy of at least 1 mil Circular Error Probable or CEP, required, .5 mil CEP desired, and improved survivability with an Initial Operational Capability in 1995 or sooner.

Mr. DICKS. How many are needed and at what total procurement cost?

Dr. SCULLEY. The current program is to develop and build 1,000 missiles at a development and procurement cost of approximately $1.2 billion.

Mr. DICKS. For the record, what are the proposed performance characteristics and specifics for the missile?

[CLERK'S NOTE.—Classified insert removed.]

Mr. DICKS. There obviously is opposition in West Germany. What effect is that opposition going to have on this program?

General PIHL. We are trying to separate the need to develop and produce the equipment in terms of our deterrence and our warfighting from the deployment decision. The current opposition that has been voiced by the German Government, of course, will slow us down.

Mr. DICKS. The Air Force requests funds to develop a tactical nuclear SRAM missile. Why are Follow-On Lance and SRAM-T both needed?

General PIHL. Sir, they are needed to carry out General Galvin's war plan. They give you a combination of weapon system to work within the range of 500 kilometers back into the front, air-delivered and surface-to-surface missile-delivered.

Mr. DICKS. What is the difference between the two systems?

Dr. SCULLEY. Follow-On To Lance is a surface-to-surface missile. Clearly, the SRAM-T is a stand-off air launched air-to-surface missile.

Mr. DICKS. Which has higher priority from CINCEUR?

General PIHL. Sir, it is my understanding that General Calvin spoke a preference for FOTL when he was here in previous testimony, stating that FOTL was his number one nuclear priority. The Defense Department has prioritized them evenly, as far as Admiral Crowe, the Chairman of the Joint Chiefs is concerned. Follow-On To Lance, we are trying to stretch out to 450 kilometers to meet SACEUR's requirement and I don't know the range of TASM. I can provide that for the record.

[CLERK'S NOTE.—Classified insert removed.]

Mr. DICKS. The Army wants to have the Lance replacement use the same launcher as used for conventionally armed MLRS (Multiple Launch Rocket System) and ATACMS (Army Tactical Missile

System). What are the arms control implications of mixing conventional and nuclear munitions on similar launchers?

General PIHL. Under compliance of the INF treaty, sir, you could if you were not careful back yourself into all MLRS' being inspectable under the treaty. Clearly, we are able to build the Follow-On To Lance missile to have a specific signature visible to the eye, and an inspectability that is totally different from the other family of munitions fired from MLRS launchers.

Mr. DICKS. So you do favor a dedicated launcher for the Lance replacement?

General PIHL. We do not. The launcher could be common, but we would need to have a different visual signature for either the FOTL missile or the launcher when loaded with a nuclear missile if verification ever became a requirement.

Mr. DICKS. What are you going to do with the $32.8 million requested in 1990?

Provided a detailed breakout for the record.

Dr. SCULLEY. The $32.8 million will be spent as follows: About $14 million on government costs that include releasing the proposal, source selection and nuclear warhead study activities, $19 million toward the contract and other government-furnished equipment costs to initiate hardware-software development, producibility engineering and planning and the integrated logistics support.

[The information follows:]

$13.8 million Government costs:
- Release of competitive Request For Proposal (RFP);
- Source Selection Evaluation Board (SSEB) process;
- Continue technical analyses;
- Phase 2a Nuclear Warhead Study;
- Prepare Milestone II documentation.

$19.0 million Contract and GFE Costs:
- Award FSED contract;
- Intitiate hardware/software development;
- Producibility engineering and planning;
- Initiate prototype material procurement;
- Intergrated Logistics Support (ILS).

ARMY DEVELOPMENT AND EMPLOYMENT AGENCY

Mr. DICKS. What about ADEA—where are we with ADEA? The committee expressed great interest in maintaining and even expanding the role of Army's ADEA organization. Yet the proposed fiscal year 1990 funding of $3.9 million is lower than last year's appropriation of $5 million. Fiscal year 1991 is projected to be lower.

Dr. Sculley, why is ADEA afforded such a low priority by the Army?

Dr. SCULLEY. I wouldn't say it was low. It is strictly an affordability question and an extremely difficult decision to make.

Mr. DICKS. The Appropriations Conference Committee for Fiscal Year 1989 requires the Department of Defense to submit a report on ADEA by April 1. Will the report be submitted on time?

General PIHL. Yes, sir, it will be. The report is finished and it is being transmitted at this time.

Mr. DICKS. Can you discuss any of its major features today?

General PIHL. Yes, sir, I can. It concludes that the decision to disestablish ADEA is final, and that there is not a requirement for the Commanders-in-Chief to have a developmental activity that is like ADEA.

Mr. DICKS. Why is that?

General PIHL. Sir, I can't speak for the authors of the study, but that was their conclusion.

Mr. DICKS. Please explain why the Army reprogrammed $3.6 million out of fiscal year 1988 ADEA funds without Congressional approval, in spite of the committee's special interest in ADEA, as expressed in our report published in June 1988. How were these funds used?

General PIHL. Sir, the 1988 reprogramming of $3.59 million was accomplished below threshold, as you indicate. The funds were sent to other Army programs as I believe General Freitag indicated on the 2nd of March in his testimony, that was 1988 money, and it occurred before the time that we had the expressed interest in ADEA, as we see the record.

Mr. DICKS. Why didn't you restore the money once you knew about our interest?

General PIHL. As you know, I was the Commanding General of ADEA, proudly, and when the decision was made in the 1989 amended budget submitted to close the ADEA program, we did not restore monies to an activity that was going out of business.

Mr. DICKS. Thank you, Mr. Chairman.

TERMINALLY GUIDED WARHEAD

Mr. MURTHA. Terminally guided warhead for MLRS slipped a year. What kind of a priorty does this have? Is this where we can find $100 million?

Dr. SCULLEY. It did slip in fact 18 months in development. The program has had severe technical obstacles to overcome, but in fact, has been successful. It, to me, is a show piece of international cooperation, and I have continuously supported this program over the past seven years.

Mr. MURTHA. Say this is plain English—is this thing now to the stage where it will work? I always wondered about this concept—this is the one where the parachute comes down with the weapons and hits the tank from the top?

Dr. SCULLEY. The component development which has taken place has been successful to the point that we have successfully advocated entering systems development, putting the component together and demonstrating that it works as a system.

Mr. MURTHA. So, what kind of a priority does this have?

Dr. SCULLEY. It enjoys a high priority, yet in all candor, as we look to the future, the expense of such systems must be——

Mr. MURTHA. So, this thing is going to be very expensive to field?

Dr. SCULLEY. It will be—it will be at the present time expensive in production. As we look at important parameters such as cost per kill, which I think in many ways is a fair way to look at systems, it will receive great scrutiny.

Mr. MURTHA. Is this the original production schedule, or is this your revised production schedule? This has been slipped four or

five years, hasn't it? I can remember hearing about this thing years ago. It has been very difficult to develop.

General PIHL. The Terminal Guidance Warhead an international development has slipped significantly from its original schedule because of the technology. The most recent slip between the last Selected Acquisition Report and this one was an 18 month slip.

Mr. MURTHA. How much money have we spent altogether on this system?

Dr. SCULLEY. I will be happy to provide that for the record, expenditures to date.

[The information follows:]

Through the end of FY 1989, the U.S. cost of the MLRS–TGW program will have been $170.1 million.

Mr. MURTHA. We have other questions for the record. Thank you very much, gentlemen.

The committee will now adjourn until 1:30 p.m. this afternoon.

[CLERK'S NOTE: Questions submitted by Mr. Sabo and the answers thereto follow:]

HANSEN ROTARY VALVE

Question. In the reports accompanying the fiscal 1988 and 1989 Defense Appropriations Bills, this Subcommittee expressed its strong support for research into rotary valving/rotary combustion chamber technology. In the fiscal 1988 report, the Subcommittee indicated its interest in rotary valving "in spark-assisted Diesel/multi-fuel engines." The fiscal year 1989 report expressed support for this technology "only for the purpose of developing rotary valving/rotary combustion technology . . . to achieve optimum utilization of multiple fuels."

This language seems clear to me; it directs the Army to spend this money on a multi-fuel engine technology. Yet I have heard that the contractor is being forced to conduct its research on a large diesel engine as part of the Advanced Integrated Propulsion System. This makes it difficult, if not impossible, to leverage government research money off of the private funds that have been invested in this program.

Could you explain why the Army is spending this money in a manner that contradicts a clear Congressional directive? Who made the decision? What is being done to ensure that the Congress obtains the research results in felt was necessary?

Answer. While no funds have been appropriated for this development, the Army has been supportive and has made a concerted effort to satisfy the Committee's intent. On September 23, 1988, a 24-month contract for $703,444 was signed by Hansen Engine Corporation, of Minnetonka, Minnesota, to demonstrate rotary valving technology in a Cummins L–10 multi-cylinder diesel engine. This demonstration is being performed on a modern four valve, 240 HP diesel engine employing high output parameters, not on the 1450 HP Advanced Integrated Propulsion System. The contract includes provisions for demonstrating the engine with each of the two tactical fuels of interest to the Department of Defense, DF–2 diesel fuel and JP–8 jet fuel. We are, therefore, doing work on a multi-cylinder engine and we are using multiple fuels as the Committee di-

rected. So, I would say that the Army has not contradicted the Committee's directive, but has made a good effort to produce a meaningful demonstration that will contribute to the Army's vehicle propulsion requirements. At the conclusion of the contract, a report will be provided to the Congress.

M1 BLOCK III TANK

Question. the Army budget calls for continuing research on the so-called M1 Block III tank, while reducing M1A1 tank production to 448 in fiscal year 1990 and 261 in fiscal year 1991.

What has happened to the M1A2?

Answer. The total Abrams program—Army and Marine Corps—is 603 M1A1 tanks to FY 1990 and 516 tanks in FY 1991. The Army has budgeted for long-lead and non-recurring in FY 1990 to support production deliveries of the M1A2 in 1992. As of the time of submission of the President's Budget, all Abrams tanks for the Army from FY 1991 through FY 1994 were to be in the M1A2 configuration.

Question. Is this Block III vehicle a variant of the M1A1, or an entirely new tank? How will its configuration differ from that of the M1A1, or the M1A2? Is this the beginning of the Armored Family of Vehicles? Would it be possible to integrate Block III technology in the basic M1 tank? Has the Army considered producing the "M1A3" variant?

Answer. The Army may conclude as it completes its technology base work that the Block III is more new than product improved. If so, the Army may then have to declare a new start tank, but until that work is done, both options are open. It is unclear at this stage what Block III will look like. Final configuration of the tank is dependent upon successful demonstration of technologies in the early 1990's and available resources. Block III will be designed to incorporate major enhancements in mobility, firepower and survivability over its predecessor. Block III is the lead system for vehicles in the heavy protection level of the Army's Heavy Force Modernization program. This program is not the Armored Family of Vehicles, but is a disciplined approach to continued modernization of the Army's close combat heavy forces to keep pace with the Soviet modernization program.

Question. Can you provide a cost-comparison between the M1A1, the M1A2, and the M1 Block III, in same year dollars, at equally efficient rates of production?

Answer. If the M1A1 and M1A2 were produced at comparable rates of 60 per month at both government tank plants, the average unit cost for the M1A1 (FY 1989 constant dollars in millions) would be $2.614 and the average unit cost for the M1A2 (FY 1989 constant dollars in millions) would be $3.146. The comparable cost for Block III has not been developed since the exact configuration and production strategy are not final.

Question. Would any time elapse between the end of M1A1 production, and the beginning of M1 Block III production?

Answer. The Army will transition to the M1A2 (Abrams Block II) in 1992. Block III production will begin in 1997.

[CLERK'S NOTE.—End of questions submitted by Mr. Sabo. Questions submitted by Mr. McDade and the answers thereto follow:]

ARTILLERY DELIVERED EXPENDABLE JAMMERS

Question. The Committee has for some time strongly supported the Army's development of an artillery-delivered expendable jammer, the XM–867.

The Committee was under the impression that FY 1990 would be the last year development funding was required for this program, and that roughly $5 million would be needed. In the original FY 1990–91 budget submission, $3.6 million was requested for FY 1990, and $1.5 million in FY 1991.

What is the reason for two more years of development funding. Did fiscal constraints drive this? Could the program be executed if the total of the FY 1990 and 1991 requests were appropriated in FY 1990?

Answer. Fiscal constraints dictated lengthening the development program by two years. The funds identified in FY 1987 were cut such that the program schedule had to be extended two years.

The program cannot expend funds in FY 1990 if all funding is appropriated in FY 1990 because funding is required in FY 1991 for government test efforts. DTII testing occurs in FY 1990 while OTII testing occurs in FY 1991. The OTII test is dependent on the data from the DTII test to fire/operate the systems and therefore cannot be conducted prior to its scheduled date in FY 1991.

Question. The XM867 will utilize a 155mm projectile. Which type of 155 mm projectile will be used in production and why; the M483, the extended range M864, or some other type?

Answer. Although the M483 is scheduled to go out of production in FY 1989 the item can be manufactured by the production contractor. In fact, current plans require the production contractor to build and deliver AD/EXJAM as a complete end item (including the M483 shell).

Initial investigation reveals AD/EXJAM would fit in an M864 shell but with only 4 jammers vice 5 in the M483.

Question. What is the planned procurement profile and acquisition strategy for the XM867? Provide quantities and programmed funding requirements by fiscal year.

Answer. The most economical rate of production results in an average cost per round of $4000 after five years. We attempted to program this rate at $20 million the first year and $15 million each subsequent year which would result in 20,000 projectiles after five years; however, overall dollar ceilings in this program area restricted the amount that could be programmed. Current funding levels are shown below along with appropriate quantities.

PROGRAMMED FUNDING

	Quantity	Amount
Fiscal year:		
1992	500	$10,543,000
1993	850	15,839,000
1994	650	9,840,000
1995	630	9,471,000

PROGRAMMED FUNDING—Continued

	Quantity	Amount
1996	630	9,471,000
1997	630	9,471,000
1998	630	9,471,000
1999	630	9,471,000
2000	150	2,130,000

Current funding levels would result in only low rate initial production quantities being produced; therefore, the cost per round increases significantly from approximately $4,000 to $16,000 per round.

120MM MORTAR

Question. Last year the Army advised the Congress that $7.3 million was required in Fiscal Year 1989 to complete type classification, operational testing, and enhanced ammunition development for the 120mm mortar program. These funds were authorized and appropriated by Congress.

Is the FY 1989 funding adequate to carry out the planned RDT&E Program for the 120mm mortar? If not, what amounts are required and what actions does the Army plan to take to fund the FY 1989 program? Provide a break-out of which activities are funded, and which, if any, require additional funds.

Answer. The FY 1989 RDT&E program for the 120mm mortar is fully funded. The program had a $1.2 million shortfall that was satisfied by reprogramming FY 1988 funds from within the same Program Element. The shortfall resulted from delays associated with an FY 1988 program review; higher than estimated costs for conversion of the current M106A2 mortar carrier; and a requirement to conduct retesting during nondevelopmental Ammunition Certification Testing. FY 1989 funds were not used because of FY 1989 Congressional language restricting "special interest program" reprogrammings.

The FY 1989 RDT&E Program continues development of the family of enhanced ammunition; conducts safety certification testing for the nondevelopmental ammunition and necessary retesting; conducts operational testing; supports a conversion program for the current M106A2 mortar carrier and delivers prototypes; and conducts additional blast overpressure testing. Development of a Full Range training Cartridge ($1.1 million) is unfunded because there is no intent to procure the cartridge. Price proposals submitted by the contractor show no cost advantage over the HE cartridge.

Question. Is there a requirement for any fiscal year 1990 funding? If so, how does the Army plan to provide the necessary funds? Will there be a request for 120mm mortar RDTE funds in the revised FY 1990 Army budget?

Answer. The 120mm mortar RDT&E program requires FY 1990 funding of $7.0 million to conduct operational testing of the family of enhanced ammunition; refurbish test vehicles at completion of operational testing; fund a blast overpressure analysis by The Surgeon General; perform a tube durability study; and fund the proba-

bility of having the conduct operational testing of the carrier variant with enhanced ammunition instead of nondevelopmental ammunition, due to blast overpressure problems associated with nondevelopmental ammunition in the carrier variant.

The Army has proposed $7.0 million in FY 1990 RDT&E funding in its FY 1990/1991 Amended Budget Submission, currently under consideration in the Department.

[CLERK'S NOTE. End of questions submitted by Mr. McDade. Questions submitted for the record and the answers thereto follow:]

ANTI-ARMOR PROGRAMS

Question. The Defense Department and the Congress have made significant investments in Army anti-armor capabilities in light of unexpected advances in the Soviet threat.

General Pihl, please outline for us the Army's overall anti-armor strategy. Are we making progress? Address U.S.: Tank armor programs; tank gun and ammunition initiatives; tank upgrades (M–1 block II); new tank (M–1 block III); man-portable anti-tank systems (AAWS–M); TOW missile upgrades; TOW missile replacement (AAWS–H); smart submunitions for missiles (e.g. MLRS Terminally Guided Submunition, ATACMS Block II, and SADARM): Fiber Optic Guided (FOG) missiles; Hellfire missile upgrades; and Mines.

Answer. The Army has established a viable Force Modernization Strategy to which A3 modernization needs have been linked. The strategy is threat driven and seeks to establish a modernization rate from a qualitative and quantitative perspective that is competitive with the expected growth in Soviet capabilities. Our Force Modernization program is built upon the principle of equipping the Army's "First to Fight" units, on a continuous basis, at rates which are competitive with the Soviets: A3 modernization goals are entitirely consistent with this approach. Resourcing and executing our planned programs will provide the qualitative edge necessary to compensate for the traditional quantitative advantages held by the U.S.S.R.

While this budget provides significant resources we still have a ways to go. Our Mod Plan charts the course for the future and identifies in detail the weapons system listed; why we need them and how they fit as an integrated combined arms force on the battlefield. The plan is in final staffing within the Department of the Army and will be provided to the Congress in the near future.

Question. Are all of the above really necessary, and why must they all be developed simultaneously?

Answer. The A3 Mod Plan will show how the systems fit on the battlefield. It is necessary to present the enemy many ways to die simultaneously so that he cannot concentrate on a single counter which quickly negates a newly fielded weapon. Each of the systems is a necessary part of the combined arms team. Successful execution of AirLand Battle doctrine requires forces and systems that can strike throughout the depths of the battlefield in the same instant. These systems provide that capability.

Question. Can the Army prioritize these programs?

Answer. Yes. The budget contains A3 systems whose priorities were based upon the principles and rationale contained in the Army's Force Modernization Strategy and the A3 Mod Plan.

Question. Last year, many of our anti-tank R&D programs were underfunded, and the Congress provided many add-ons. What is the situation this year?

Answer. In the FY 1990 RDT&E budget, all of our anti-tank programs are fully funded.

Question. General Pihl, provide for the record the funding for each of the above named programs in each fiscal year 1988 to 1994 by appropriation and line item along with each program's total estimated cost.

Answer. The following represents the funding for each of the above named programs is fiscal year 1988 to 1994. (We have supplemented programs with others we feel are appropriate.) Each Armor/Anti-Armor program's total estimated cost follows.

[In millions of dollars]

	Fiscal year—						
	1988	1989	1990	1991	1992	1993	1994
A. Tank Armor Programs	29.6	35.2	65.5	66.9	53.2	52.0	58.2
B. Tank Gun and Ammunition Initiatives	301.4	321.5	336.3	413.8	448.6	557.2	555.8
C. Tank Upgrades (M–1 Block II)	71.9	59.6	61.5	1,258.8	1,984.3	1,919.6	1,889.1
D. New Tank (M–1 Block III)	0	0	25.4	62.1	226.1	302.6	286.6
E. Man-Portable Anti-Tank Systems (AAWS–M)	37.4	128.2	158.7	55.8	155.2	239.5	600.2
F. Tow Missile (RDTE, PROC, and Upgrades)	242.2	243.4	235.5	270.0	315.6	322.0	313.3
G. Tow Missile Replacement (AAWS–H)	3.0	46.0	69.6	103.8	132.6	165.3	145.1
H. Smart Submunitions for Missile and Fire Support Systems	352.7	377.8	465.6	403.0	562.6	706.5	829.0
I. Hellfire Missile Upgrades	312.9	314.4	287.9	327.4	337.6	457.7	153.6
J. Mines	93.4	113.1	165.0	120.2	112.1	130.3	328.4
K. M1A1 Tank Production	1,856.6	1,522.3	1,400.6	121.8	0	0	0
L. Bradley Fighting Vehicle System	832.0	816.9	828.0	916.6	967.2	906.4	916.0
M. Kinetic Energy and Hypervelocity Missiles	7.6	0	0	0	5.8	40.7	103.3
N. Directed Energy Weapon (DEW)	10.8	25.2	24.9	49.9	9.2	9.7	9.8
O. Chemical Systems	8.5	7.9	9.1	9.4	9.1	9.2	9.3
P. Other Anti-Armor Support Programs	910.4	788.9	858.8	1,091.7	1,207.0	1,150.7	955.8
Total Armor/Anti-Armor Programs	5,070.3	4,800.4	4,992.3	5,271.1	6,526.5	6,969.5	7,153.7

The Fiber Optic Guided Missile (FOGM) is the Non Line of Sight (NLOS) component of the Forward Area Air Defense System. Initially, NLOS will be fully capable of performing both the anti-aircraft and anti-tank missions, but, primarily performs in the air defense role until organizational and operational employment issues are resolved. Therefore, the Army has included FOGM in the Armor/Anti-Armor Modernization Plan as directed by Congress, but, not in the total funding for Armor/Anti-Armor Programs. The funding for Fiber Optic Guided Missiles (FOGM) follows.

[In millions of dollars]

	Fiscal year—						
	1988	1989	1990	1991	1992	1993	1994
Q. Fiber Optic Guided Missiles (FOGM)	60.4	144.2	171.8	229.5	245.2	411.8	460.8

Every effort was made to assign a line item to a specified program. There were instances where line items qualified for more than one program (e.g., 120MM Light Weight Gun—Tank Gun and Ammunition Initiatives or New Tank (M-1 Blank III)). To avoid double counting, these lines were added to one program only. Within Research, Development, Test and Evaluation, it was determined that system nonspecific line items (6.1, 6.2, 6.3A Program Elements) may contribute to more than one Armor/Anti-Armor Programs. Generally, these lines were grouped under Other Anti-Armor Support Programs. Finally, RDT&E was aggregated to the project level of detail which may include multiple work packages that support more than Armor/Anti-Armor Programs. The list of program funds by appropriation and line item follows.

[CLERK'S NOTE.—Classified insert was removed.]

HEAVY FORCE MODERNIZATION

Question. The budget contains funds in many programs for a new initiative which the Army calls "Heavy Force Modernization." General Pihl, please explain the concept of Heavy Force Modernization.

Answer. The concept of Heavy Force Modernization is a sub-set of the Army's total force modernization effort. It focuses on our strategy for modernizing the heavy force. Heavy Force Modernization is based on the results of thorough assessment of current heavy force capabilities relative to the future requirements of the battlefield, the need to accelerate fielding of advanced technology, and an understanding that we must find a better, more efficient way of doing business.

Heavy Force Modernization is a disciplined and prioritized outgrowth of the work initiated by the Army's Armored Family of Vehicles Task Force (AFV-TF). The task force identified significant warfighting improvements and operational savings through a family approach for heavy systems, which emphasized commonality, multi-mission capabilities, common modular components, and mission specific modules designed into systems from their inception. Based on funding realities and our most critical future battlefield requirements, we have identified six critical systems of the twenty-four AFV variants as Heavy Force Modernization package one.

The six systems in Heavy Force Modernization are the Block III tank, Future Infantry Fighting Vehicle, Combat Mobility Vehicle, Advanced Field Artillery System, Line of Sight Anti-Tank System and the Future Armored Resupply Vehicle. The first four systems will share a common heavy chassis; the latter two will be medium chassis systems. These six heavy force systems were selected to provide the maximum payoff in increased lethality, survivability, and compatible mobility on the 21st century battlefield.

The other key point concerning Heavy Force Moderniation is the imperative to field modernized systems with enhanced capabilities faster than our potential adversaries. To counter the Soviet Unions' ability to field major new heavy force systems roughly every seven to ten years, the Army must rapidly accelerate the transition of technology to existing or emerging systems. To accomplish this we have focused the Army's tech base to mature pacing technologies advances at the right time relative to the projected threat, and expanded the use of Advanced Technology Transition Demonstrations (ATTD) to reduce the time and expense associated with a traditional demonstration/validation phase. After a Milestone I Decision for HFM package one, each of the six HFM systems will proceed to its own Milestone II Decision for Full Scale Development (Milestone V for Block III tank).

In summary, the purpose of Heavy Force Modernization is to meet the evolving and improving threat by selectively modernizing our most critical Heavy Force systems. The strategy entails an innovative development and acquisition approach which will get these enhanced systems into the hands of our soldiers as quickly as possible.

Question. How much is included in your FY 1990 request for this initiative? Provide a detailed breakout for the record by line item.

Answer. The FY 1990 request includes $248 million for Heavy Force Modernization, all of which is in RDT&E. The funding break out is as follows: $5 million to complete Concept Exploration and Definition by three industry teams, $98 million for the Component Advanced Technology Test Bed to demonstrate maturity and operational potential of pacing technologies, $62 million for the Common Chassis Advanced Technology Transition Demonstration (ATTD), $7 million for the Combat Mobility Vehicle ATTD, $1 million for the Advanced Field Artillery System ATTD, $50 million for the LOSAT advanced development, and $25 million for Systems Engineering Analysis.

Question. Congress provided add-on funds last year to accelerate upgrades to the M-1 tank—called M-1 Block II—and new funds to define requirements for future upgrades for the M-1 tank—called M1 Block III. Under this new strategy, does M-1 Block III mean further M-1 upgrades or do you envision starting development of a new tank program? What justification does the Army have for a new tank?

Answer. The tank that follows Abrams M1A2 may either be a third block of product improvements to the M1 or a new tank. The Army's acquisition strategy provides industry with competitive opportunities to offer solutions in response to performance oriented RFPs; the Army will not dictate the design, but will establish performance bands. Whether or not it is a Block III to the current chassis or a new tank ———. The Milestone V Product Improvement Program apparatus of the DoD Acquisition Directive allows for timely fielding and causes the same level of oversight and DoD decision as a Milestone I new start. The benefit in using a Milestone V approach is the reduction in program documentation and the streamlining of the process by elimination of heel-to-toe development if a new start is imposed. The envisioned improvements to

the Block III tank are: a new gun, autoloader, countermeasure technologies, advanced power pack, improved track and suspension, weight reduction and introduction of modular armor to improve survivability.

Success of the Abrams Block II development program is key to Block III. The following technologies, which improve survivability, lethality and fightability, will be incorporated into the Block II tank and will provide a technological bridge to future Block III enhancements: Commander's Independent Thermal Viewer, improved range finder, position navigation and intervehicular information system all linked through a data and power bus architecture to improve reliability, availability, maintainability and survivability. Application of armor technologies will also improve survivability. Without a robust Block II development and M1A2 production program, cost and schedule risks increase for Block III.

Question. Is there complete consensus in the Army over the direction of the initiative and the vehicles to be covered by it?

Answer. Yes. The Heavy Force Modernization strategy and its priority systems have been determined with extensive consultations and comprehensive input from senior Army leaders. It is our consensus that this approach is a blueprint for the disciplined evolution of the Army's heavy force into the 21st century.

Question. Name the other vehicles besides the tank which are funded under this initiative and explain urgency of requiring their "new start" development programs in fiscal year 1990.

Answer. No individual system new starts are designated for FY90. What is scheduled are a series of Advanced Technology Transition Demonstrations (ATTD). These will provide the technological feasibility and operational potential of pacing technologies. The Milestone I Decision in 2d Qtr FY 1990 will determine whether to proceed with the concept of a family of heavy force systems. The separate systems, which will then proceed on their own developmental schedules are the Block III tank, Future Infantry Fighting Vehicle (FIFV), Advanced Field Artillery System (AFAS), the Future Armored Resupply Vehicle—Ammunition (FARV-A), Line of Sight Anti-Tank (LOSAT) and the Combat Mobility Vehicle (CMV).

The urgency of beginning HFM developmental programs is driven by a detailed analysis of projected Soviet modernization and the Army's warfighting needs to counter this threat. Put simply, we must develop now to field the enhanced systems required for the future battlefield. The centerpiece of HFM is the Block III tank, which we must field by FY 1997 to overmatch Future Soviet Tank III (FST III). Since Army doctrine requires our heavy forces to operate in combined arms operations, the HFM companion systems to the Block III tank will be brought on line as rapidly as possible to provide compatible survivability and mobility for systems which operate in the same battlefield environment.

Question. Explain how you have restructured your "technology base" projects to integrate into this initiative.

Answer. The 1987 Defense Science Board (DSB) Summer Study on Technology Base Management recommended careful selection and timely execution of Advanced Technology Transition Demonstrations (ATTD) to more rapidly transition technology to systems.

The use of ATTDs was recommended by the DSB in lieu of the traditional, more costly, and time consuming process that included a demonstration/validation phase. The Army has embraced that recommendation and created several ATTDs which focus on specific technology barriers that must be overcome prior to entering Full Scale Development. The creation of modernization plans, such as the Heavy Force Modernization Plan (HFM), allows us to identify definitive windows of opportunity for technology insertion for next generation systems and product improvements. By identifying the pacing technologies that must be demonstrated and when those demonstrations must be accomplished to meet system schedules, we have restructured or added the following demonstrations to support Heavy Force Modernization: (General)—Component Advanced Technology Test Bed and Common Chassis ATTD; (Specific)—Advanced Field Artillery System ATTD, Future Armored Resupply Vehicle—Ammo ATTD, Combat Mobility Vehicle ATTD, and the Future Infantry Fighting Vehicle ATTD.

Question. Explain why you want to pursue a "common chassis" for this program. What independent, analytical data exists to show this concept to be cost effective?

Answer. There are two key reasons why the Army has decided to adopt a common heavy and medium chassis approach to development of its next generation of heavy force systems. The first reason is efficiency. A common chassis generates savings by reducing the number of separate items requiring development and testing. Further savings are achieved in reduced facilitization costs and increased production quantities of common components and repair parts. In addition, common chassis will simplify training of maintenance personnel and vehicle crews.

The second and most important reason for a common chassis are the tactical and operational advantages gained by systems that have compatible mobility and survivability. Our forces will also be "lightened" and more agile through the reduction in the diverse types of repair parts, tools, etc. which must be moved on the battlefield.

The Army has examined the feasibility and cost effectiveness of a family of close combat systems. Initial analysis conducted internally by the Armored Family of Vehicles Task Force, in conjunction with Army Materiel Command and the Training and Doctrine Command, demonstrated the cost effectiveness of a common chassis. A comprehensive Cost and Operational Effectiveness Analysis (COEA) has been initiated and will be completed prior to the Defense Acquisition Board Milestone I Decision in 2d Qtr FY90. In addition, ongoing Concept Exploration/Definition contracts involving three industry teams will provide separate cost analyses before the Milestone I Decision.

Question. Name deficiencies of existing vehicles covered here.

Answer. The Army systems fielded today are quite capable, but against the late 1990's threat systems, they will be deficient in terms of both key parameters, lethality and survivability. Based on requirements derived from the projected threat and our battlefield deficiencies, we have requirements for substantially improved tanks, fighting vehicles, self-propelled artillery, anti-armor missile systems, obstacle clearing equipment, and survivable ammunition

resupply vehicles. The Heavy Force Modernization acquisition strategy will allow fielding of systems that are not only more lethal and more survivable, but will provide comparable survivability and mobility for systems that operate in the same parts of the close combat area. These features will greatly increase the warfighting capability of these systems vis-a-vis the systems they will replace.

LHX PROBLEMS

Question. In December, GAO published an audit on the LHX program entitled "Risks Facing the Program Raise Doubts About the Army's Acquisition Strategy". The FY 1990 R&D request is $292 million. GAO says that the Army currently estimates the empty weight of LHX to be 8,000 pounds compared to the 7,500 pound goals. This excludes the weight of planned improvements and tactical "kits." Is there a weight problem?

Explain the concept of tactical kits.

What items are in such kits?

Are armor kits included: would Army units really "bolt-on" armor kits just prior to combat?

Wouldn't the additional weight of various kits adversely affect the helicopter's performance which would be predicated on the empty weight goal?

Answer. The 8,000 lb. weight in the GAO LHX report referred to an estimated weight empty of a Government LHX design that met or exceeded all requirements of the draft LHX Required Operational Capability (ROC). The Government design estimate is based upon concept studies, weight trends of existing helicopters and other parametric data. During the LHX Demonstration/Validation (DEM/VAL) the contractor teams will be performing numerous requirements trade-off studies and much more sophisticated preliminary design activities to better define the weight and capabilities of an optimized LHX design with a weight empty of 7,500 lbs. or below. Concurrent with these design efforts and trade-off studies detailed combat effectiveness studies will be performed to ensure that resultant 7,500 lb. weight empty designs do not compromise LHX effectiveness. Based upon recently completed initial reviews of both LHX contractors DEM/VAL plans, the Army is confident that either team will be able to propose a combat effective LHX design within the 7,500 lb. weight empty goal.

Future product improvements nor standard combat kits were never included in the LHX weight empty goal.

Tactical kits are items of equipment that would be installed in the aircraft prior to entering combat based upon environmental conditions, threat intelligence or other scenario/mission conditions. Examples of such kits are de-ice systems for cold weather operations; chemical filters and detectors if intelligence indicated the presence of chemicals on the battlefield; Aircraft Survivability Equipment (ASE) tailored to a specific threat; auxiliary fuel tanks for extended range missions and specialized fairings for missions which require additional signature reduction. The use of such kits is common Army practice and is consistent with approved military standards for weight calculations.

The current Government design for LHX includes kits for part of the crew armor protection. This concept is by no means finalized, but if utilized the design would minimize the time necessary to install such armor. The DoD Joint Technology Coordinating Group for Aircraft Survivability (JTCG/AS) currently has a project underway to examine the feasibility of implementing a "modular" armor concept for helicopter applications.

The LHX performance is not based upon weight empty, but rather on primary mission take-off gross weight using 95% of Intermediate Rated engine power (IRP). For missions requiring extensive combat kits, the T800 unique 10 minute Maximum Rated Power (MRP) rating (approximately 10% more power than IRP) can be utilized to retain take-off flight performance at these higher gross weights.

Question. The Packard Commission recommended use of prototypes. In the LHX program, however, the Army will not build a prototype until after the paper competition has been concluded. What are your views on the need for prototypes prior to the "down-select decision?

GAO offers some alternatives, such as competitive prototyping of the key mission equipment like avionics or delaying the full scale development decision until prototype mission equipment is demonstrated. What is your reaction?

Answer. Obviously, there are benefits to be obtained from a competitive prototype fly off. However, after consideration of several alternatives, the Army and OSD selected the current program strategy as the most cost effective within budget limitations. The current Demonstration/Validation phase includes competitive demonstration of key prototype components of the Mission Equipment Package, engineering simulations, design trade studies and wind tunnel testing of proposed configurations. The emphasis during this phase of the program concentrates on the demonstration of critical LHX prototype components such as target acquisition, night pilotage, and high speed processing. The Army is confident that the information generated during the Demonstration/Validation Phase of the program will lead to a fully informed source selection decision. Prototype LHX aircraft systems will be fabricated and fully tested during the Full Scale Development program to ensure to the Army that the LHX provides the requisite capabilities prior to production commitments.

Question. GAO reports that the Army is currently estimating the unit cost at $8.2 million each versus the $7.5 million goal. How do you plan to meet the cost goals?

Answer. The Army has established weight (7,500 pounds) and cost ($7.5 million, unit flyaway, FY 1988 dollars) constraints for the LHX program. These constraints were set after extensive analyses by both the Army and the competing contractor teams, and are considered to be achievable and reasonable. At the time these were set, the Army's estimates for a fully compliant draft Required Operational Capability (ROC) helicopter were 8,114 pounds empty weight and $8.2 million unit flyaway cost. It must be clearly understood that the primary purpose of the Demonstration/Validation (DEM/VAL) Phase is to refine and finalize the LHX ROC and

System Specification to achieve an LHX that maximizes combat effectiveness within the weight and cost goals. The LHX draft ROC and System Specification represent the starting point for trade-offs to define such a design. Before any trade-offs are accepted, a thorough examination of all aspects of combat effectiveness, lift cycle cost, and supportability will be examined both by the contractor teams and independently by the Army. The current Army estimated empty weight for a full draft ROC compliant LHX design is less than 7,800 pounds. Each of the LHX contractor teams has provided a cost and weight compliant LHX design as a baseline with their DEM/VAL proposals. Either of these designs represents an extremely combat effective LHX. In addition, the Army will perform an extensive Cost and Operational Effectiveness Analysis (COEA) utilizing an LHX design that meets both cost and weight goals to ensure that the LHX will be a combat effective aircraft system.

Question. GAO reports that "recent procurement funding projections do not provide enough procurement money to produce the LHX at planned rates." What funding shortfall exist in your current five year plan?

Answer. There are no procurement shortfalls for LHX in our current five year plan. The GAO was referencing a preliminary planning budget beyond the five year plan, not approved budget. It is our intent to fully fund the LHX program throughout its life cycle. We will provide out year funding projections when available.

Question. The FY 1989 Appropriations Act requires that the "designs of the Army LHX helicopter, the Navy Advanced Tactical Aircraft, and the Air Force Advanced Tactical Fighter must incorporate Joint Integrated Avionics Working Group standard avionics specifications no later than 1998." What is the Army doing in LHX to meet Congressional "joint avionics" requirements?

Is the use of ICNIA/INEWS mandatory?

Answer. The Army is an active participant in the Joint Integrated Avionics Working Group (JIAWG), as are the two competing industry teams that are under contract for the LHX Demonstration/Validation Phase. The LHX Dem/Val Request For Proposal requires the contractors to use the current JIAWG Mission Equipment Package (MEP). The Army developed the JIAWG requirements jointly with the Air Force and Navy through the JIAWG organizational structure. The most recent effort is the revision of the tri-service Joint Integrated Avionics Plan which has been signed by the three Service Acquisition Executives as of 1 March 1989. This plan, which reflects the commitment of the Services to the JIAWG concept, will be sent to Congress by OSD. The LHX and the Air Force ATF programs will both use the same JIAWG specifications and standards as they enter FSD in December 1990 and January 1991 respectively. The goal is interchangeable avionics hardware. The Navy A-12 will apply these common avionics items in preplanned product improvement effort in 1998.

The LHX contractors are required to use ICNIA and INEWS technologies as the baseline for their communications, navigation, identification and their electronic warfare design efforts. The contractors are also required to provide operational and cost effectiveness analyses if it is concluded that the ICNIA and INEWS tech-

nologies would adversely affect cost, weight or performance risk for the LHX program.

Question. For the record, break out FY 1989 and FY 1990 funding for LHX airframe and propulsion lines in detail, showing how the budgeted amounts relate to contracts at target and explaining the difference.

Answer. RDT&E funding for the LHX program in FY 1989 and FY 1990 is broken out below. Budgeted amounts and negotiated contract amounts for the Demonstration/Validation Phase (FY 1989 and FY 1990) of the program are identical.

[In millions of dollars]

	Fiscal year—	
	1989	1990
Dem/Val Contracts with Competing Teams:		
Airframe	23.5	47.1
Mission Equipment	81.7	164.8
Integrated Logistics	3.9	8.1
Total	109.1	220.0
Other Contracts and Lab Support	11.3	16.3
Program Office Operations	3.5	4.4
LHX/MEP Total	123.9	240.7
T800 Engine	55.4	51.7
LHX Program Total	$179.3	$292.4

FOLLOW ON TO LANCE (FOTL) MISSILE

Question. The budget proposes beginning a $1 billion program to replace the Army's nuclear capable Lance missile for NATO which is obsolete. Lance is used to support the European theater. What is your requirement to replace the Lance missile?

Answer. The Lance missile system was fielded beginning in 1972 with a required service life of five years and a desired of ten years. The system is now experiencing degraded system reliability due to age. A Service Life Extension Program, begun in 1987, will maintain present capabilities through mid-90's at which time a follow on system should be fielded. Current Lance has a low rate of fire, is extremely manpower intensive, cannot range all targets of the threat lead operational echelon and is not sufficiently survivable on the modern battlefield. Baseline requirements for replacing Lance are contained in the 1983 Montebello Decision, FY1990–94 Defense Guidance, Mid-Term Objective #10, and is further delineated in SACEUR's 1985 and subsequent 1988 Nuclear Weapons Requirement Studies.

Question. Why is it urgent now?

Answer. SACEUR stated, in his 1988 Nuclear Weapons Requirements Study, an urgent need to field a modernized replacement for Lance ———. Even with our streamlined competitive acquisition strategy, we can only maintain the option to meet ——— if we initiate a Full Scale Engineering Development program for Follow-On To Lance in FY 1990.

Question. How many are needed and at what total procurement cost?

Answer. The most current SACEUR, CINCCENT, and CINCPAC Nuclear Weapons Requirements Studies (NWRS) state a ——— missiles. This quantity does not include stockpile reliability, logistics, training and testing requirements. The actual total cost will depend on the results of the competition for the development/production contract. Our competitive acquisition strategy and estimated total program cost of approximately $1.1 billion is based on a program to develop and produce 1000 FOTL missiles.

Question. What are the proposed performance characteristics and specifications for the missile?

Answer. The current requirement for FOTL calls for development of a nuclear missile capable of being fired from a MLRS-type Launcher, with a ———.

Question. Is there opposition in West Germany to this program?

Answer. Since 1983, the NATO alliance, including the German government, has continuously supported NATO nuclear modernization including the development of a Follow-On To Lance. Current opposition within Germany is focused on the perceived requirement to make a deployment decision now, but the United States has stated no such requirement. The requirement for modernization is well documented and is not in dispute; the requirement for a deployment decision is flexible and need not be made until an appropriate point in the future.

Question. The Air Force requests funds to develop a tactical nuclear SRAM-T missile. Why are Follow-on To Lance and SRAM-T both needed?

Answer. FOTL and SRAM-T are complementary weapon systems of equal importance to balanced theater nuclear modernization. Requirements for both systems are identified in SACEUR's 1985 and 1988 Nuclear Weapons Requirements Studies. Without FOTL, NATO's relatively few aircraft main operating bases would be vulnerable to a preemptive attack and the only NATO theater based force would be degraded. This is a very unstable situation.

Question. Don't they both do the same job?

Answer. No. Each system is intended to meet differing target requirements. FOTL will provide the capability to hold at risk battlefield targets of the threat lead operational echelons and fixed targets having a direct impact on the corps level battle. Additionally, FOTL provides the capability to strike deep targets of interest to the Army Group and Theater Commander, and to provide coverage between adjacent corps. SRAM-T will provide a stand-off nuclear capability for U.S. and NATO Dual Capable Aircraft (DCA). SRAM-T will hold at risk highly defended, hard targets, area targets, and mobile/relocatable targets without having to penetrate enemy defenses. Although there is some complementary overlap of coverage areas, the nature of the primary targets for each system and associated response times dictate the need for two distinct systems. This issue was addressed by a Defense Acquisition Board (DAB) review of both systems' requirements which concluded that two systems were required.

Question. Which has the higher priority from CINCEUR?

Answer. FOTL and SRAM–T are complementary systems and of equal importance to balanced nuclear deterrence capability. On 21 February 1989 in his testimony to the Senate Appropriations Committee, General Galvin stated that FOTL is his number one priority, and SRAM–T and more modernized nuclear artillery the number two and three priorities respectively. During his testimony to the Defense subcommittee of the House Appropriations Committee on 31 January 1989, General Galvin explained that without a credible, survivable, mobile surface-to-surface missile system, the only nuclear deterrent capability beyond 30 km artillery is NATO Dual Capable Aircraft (DCA). DCA can then be easily targeted thereby reducing credible NATO nuclear deterrence.

Question. How do they differ in range?

Answer. FOTL will have a ——— to hold at risk battlefield targets of the lead operational echelons and fixed targets having a direct impact on the corps level battle. This improvement in range over the Lance system will enable FOTL to reach these primary targets which have moved beyond the range of Lance, will enable FOTL to deploy farther from the FLOT for enhanced survivability, and will provide the capability for cross corps support. SRAM–T, with its ——— will provide DCA a stand-off nuclear capability, greater survivability and the capability to put at risk deep fixed targets beyond the fly-out and return range of NATO aircraft.

Question. The Army wants to have the Lance replacement use the same launcher as used for conventionally armed MLRS (Multiple Launch Rocket System) and ATACMS (Army Tactical Missile System). What are the arms control implications of mixing conventional and nuclear munitions on similar launchers?

Answer. This approach is consistent with the current U.S. and NATO position on dual capable artillery and dual capable aircraft.

Question. Is this wise?

Answer. Yes. The Soviets currently take advantage of the enhanced survivability afforded by dual capable missile systems and the U.S. nuclear modernization efforts do not contradict the current position of not considering any further nuclear reductions until conventional arms negotiations have reached some level of parity. Also, the cost advantages of using an existing launcher make this alternative financially attractive to the U.S. and our allies.

Question. Do you favor dedicated launchers for the Lance replacement?

Answer. No. Launchers dedicated to a nuclear only system result in a unique signature on the battlefield which reduces survivability. Dedicated launchers for a nuclear only system also ties up valuable force structure which cannot contribute to the conventional battle. By combining FOTL capability with an existing conventional launcher, we maximize use of our existing force structure while still fielding an enhanced nuclear capability.

Question. How will the $32.8 million requested in FY 1990 be used?

Answer. The $32.8 million in FY 1990 will support initiation and award of the full and open competitive Full Scale Engineering Development (FSED) contract.

Question. Provide a detailed breakout for the record.

Answer.
$13.8 million Government costs:
Release of competitive Request For Proposal (RFP)
Source Selection Evaluation Board (SSEB) process
Continue technical analyses
Phase 2a Nuclear Warhead Study
Prepare Milestone II documentation
$19.0 million Contract and GFE Costs:
Award FSED contract
Initiate hardware/software development
Producibility engineering and planning
Initiate prototype material procurement
Integrated Logistics Support (ILS)

DIRECTED ENERGY WEAPONS

Question. The budget shows a rapidly rising investment in Army directed energy research: $8 million in FY 1989, $26 million in FY 1990, and $56 million in FY 1991.

Question. Why is the Army investing in directed energy research?

Answer. Directed energy can serve many useful purposes on the battlefield. Through its use, it is possible to sense, communicate, disrupt or destroy. Of special concern is its use as battlefield weapons. The principal targets envisioned are ———. U.S Army interest is in developing and acquiring the growing potential of directed energy devices and in assuring the survival of U.S. Army capability under threat of such use by adversaries.

Question. What are the objectives?

Answer. The Army is investing in Directed Energy Weapons in an attempt to balance the numerical superiority of opposing forces by neutralizing their ———. It is intended to develop practical tactical applications of Directed Energy including technological, doctrinal and organizational capabilities for their use. Equally important, the Army must ———.

Question. What weapons are ultimately envisioned? What are the main technical challenges?

Answer. Countersensor weapons and counterelectronic system weapons. The main technical challenges are realizing adequate reductions in weight, volume, and cost with increase in power efficiency for Directed Energy techniques commensurate with mobile battlefield needs.

Question. What is being done to protect U.S. forces from attacks by such weapons?

Answer. The potential susceptibility and vulnerability from systems to directed energy attack are being investigated. Programs to harden our systems and develop advanced countermeasures against directed energy attack are being pursued in both the ———.

Question. Why is such a rapid pace thought to be necessary?

Answer. U.S. systems are currently at risk from directed energy devices already deployed. Open literature indicates significant adversary development activity in these areas. The Army foresees the threat growing appreciably during the decade of the 1990's.

ASAT PROGRAM

Question. The Administration is reviewing the stragety for an ASAT program. While funds have been requested in the Navy budget, the Defense Acquisition Board designated the Army as executive agent for kinetic kill vehicles.

What will be the Army's role?

Answer. The Army has been designated the interim lead Service for the Kinetic Energy (KE) ASAT development effort. Accordingly, it has been appointed the Joint Program Manager, and established the KE ASAT Joint Program Office at the Army Strategic Defense Command facilities in Huntsville, Alabama. The full extent of the Army's role in ASAT will be decided at the Milestone 1 Defense Acquisition Board (DAB) currently scheduled for December 1989.

Question. What technologies are involved?

Answer. Technologies with application in the ASAT world fall into several major categories: boosters, sensors, seekers, and kill mechanisms. Many of the technologies being developed under the SDI Program are expected to have utility in the ASAT system of the future. Technologies developed under the Ground Based Interceptor (GBI) program, the Ground Based Radar (GBR) and the Ground Based Free Electron Laser (GBFEL) programs are expected to have direct utility in the development of an ASAT system. No new technology is needed.

Question. Would you primarily be involved in land based interceptors?

Answer. During the concept development stage leading up to Milestone 1, options for land based, sea based, or a combination of both will be examined. The full extent of the Army's involvement will be decided at that time.

Question. Will they be CONUS based?

Answer. A land based concept could potentially be in CONUS or possibly in Hawaii. The question of which locations offer the greatest benefit in terms of cost and effectiveness will be the subject of extensive analysis between now and Milestone 1.

Question. Could they hit all ASAT targets, even over the ocean?

Answer. Yes, the design performance goals are to consider low orbiting satellites and ASAT targets as defined by a near term CINCSPACE requirements document.

Question. How would the Air Force's defunct F-15 "miniature homing vehicle" technology be involved?

Answer. There would be no direct use of the MHV technology, although lessons learned from the MHV will be incorporated, especially in the area of Battlefield Management/Command, Control, and Communications (BM/C3).

Question. Would your system have to be tested against an object in space in order to be effective?

Answer. Yes. Firing against a point in space or the use of simulations would validate some functions, but testing against an object in space would ultimately be necessary. Such a test would be designed to minimize space debris, both through the use of balloons as targets and designing the flight interceptor geometry to maximize return of the debris from space.

Question. Is the Army requesting any other funds in FY 1990 for any type of ASAT research, development, or testing (either lasers or kinetic kill vehicle weapons)?

Answer. In the Kinetic Energy area, no other funds are being requested for ASAT research, development or testing. In the directed energy area, $15 million in FY 1991 is being requested for ASAT research and development.

TERMINALLY GUIDED WARHEAD (TGW) FOR MLRS

Question. TGW is a multi-national program to develop antiarmor capability for MLRS rockets. Army requests $47.2 million for continued R&D in FY 1990. Explain what TGW does and how it works.

Answer. MLRS TGW provides a smart antiarmor capability for MLRS to destroy stationary and moving armored targets to a range of over 30 KM. Each MLRS-TGW rocket carriers and dispenses three antiarmor terminally guided submunitions (TGSM). Each MLRS launcher will carry and fire 12 MLRS-TGW rockets to deliver a total of 36 TGSMs to engage enemy targets.

Operationally, MLRS-TGW missions are similar to most artillery indirect fire missions except that in the final portion of the trajectory, the TGSMs are dispensed and individually use their millimeter wave (MMW) seekers to locate, identify and attack armored vehicles in any enemy formation. Once launched, the MLRS-TGW rocket flies to the designated target area and dispenses that TGSMs over the target array. Each TGSM stabilizes and de-spins, uses its seeker to orient to the terrain, pulls up at the proper altitude and begins its search pattern. When the TGSM MMW seeker locates a target, the processor determines if it is a valid target and then guides the TGSM into a top attack of the vehicle. Target destruction is accomplished using the TGSM tandem shaped charge killing mechanism.

Question. What is the status of the development program?

Answer. MLRS-TGW is an international quadrilateral MOU development effort with France, Germany and the United Kingdom. In March 1989, the program completed Component Demonstration Substage (CDS). CDS is an MOU phase equating to the first half of Demonstration-Validation. Contract negotiations are on-going for the next phase, System Demonstration Substage (SDS). During SDS components will be assembled and a prototype tested. The milestone for Full Scale Development (FSD) will be in FY 1992.

Question. Describe recent flight tests.

Answer. The CDS captive flight test program was conducted in Germany in FY 1987 and 1988 to evaluate the performance of the brass board MMW seekers and to provide a test data base to revise the processor algorithm. Additionally, four areas "typical" central European urban and rural terrain were "mapped" with the MMW seekers to characterize false target densities. Flights were conducted using both helicopters and jet aircraft. The test results demontrated the seeker's ability to locate and classify armor targets in actual European terrain in both Summer and Winter conditions.

More recently, four TGSM drop tests were conducted at White Sands Missile Range. The first two tests used non-guided TGSM

airframes and demonstrated successful TGSM dispense and stable flight. In November 1988, the remaining two tests were conducted using preprogrammed guided TGSMs to demonstrate the operational maneuvers involved in dispense, pull-up and search. The first test was a complete success. The second was only a partial success as a result of a power amplifier failure, not caused by the flight environment.

Question. The Army's December 1988, Acquisition Report on TGW indicates that another schedule slip has occurred—from "early 1993" to "end of FY 1994".

By how many months has the schedule slipped?

It is true this will cost $96 million, as shown in your SAR report to Congress?

Answer. The December 1988 SAR reflects a total schedule growth of 15 months. This was a result of an increase from 25 months to 39 months in the contractor's estimated time required to complete SDS, as well as a one month increase in the contractor estimated time to complete the Maturation Phase (MOU equivalent of FSD). The cost growth of $95.6 million is the cost associated with this schedule growth and represents the US Army share, 40 percent, of the total MOU program costs.

Question. Explain how TGW differs from SADARM, ATACMS Block II, and the Air Force's Sensor Fuzed Weapon (SFW) which are all submunitions. Why are they all needed?

Answer. Sense and Destroy Armor (SADARM) is a program to develop an artillery counterfire submunition to be fired by 155mm howitzers and MLRS against stationary threat artillery and light armor. When dispensed over the target area, SADARM's descent parachute causes the two-color Infrared (IR) sensor to describe a spiral search pattern on the ground below. When a target is located, SADARM fires a self-forging fragment through the top of the vehicle. Because of the relatively small sensor footprint. SADARM is most effective against stationary targets.

MLRS–TGW is a maneuverable TGSM. The footprint is much larger to accommodate the changes in location introduced by moving targets. Additionally, the warhead is designed to kill modern heavy armor.

The Army Tactical Missile System (ATACMS) Block II is a program to develop a deep attack antiarmor TGSM for ATACMS. A current proof-of principle (POP) RDT&E effort is funded to evaluate Infrared TGSMs (IRTGSM). Both the MLRS–TGW MMW TGSM and the IRTGSM will perform similar functions with different seekers. Both are candidate submunitions for the ATACMS Block II program.

The Air Force SFW is an air delivered cluster munition carried in a tactical munition dispenser which is ballistically launched from aircraft. The munition dispenser performs a timed dispense of ten BLU–108–8 canisters along a linear target, such as an armor march column. At the proper altitude, each of the BLUs dispense four "skeet type" submunitions which perform in a similar manner to SADARM. A single dispenser carriers a total of 40 submunitions. SFW uses a two color IR sensor and a self-forging fragment as a kill mechanism. Its targets include light and heavy armor, support vehicles and self-propelled artillery. The submunition footprint is

similar to that of a single SADARM munition, but the penetration is greater.

The above munitions are complementary of each other. They are capable of performing similar functions but are optimized to fulfill difference battlefield missions. SADARM is a counterfire system to attack thin armor and artillery positions at a known location. MLRS–TGW is designed to attack moving armored formations at tactical ranges. Both munitions can be used to engage either target category, but are most effective against their designated target set. ATACMS Block II will provide deep attack of the threat second echelon armor formations before they can be committed to the close battle. SFW provides the Air Force the capability to attack high payoff targets beyond the range of rocket and missile artillery

Question. Provide, for the record, funding in each fiscal year 1988 to 1991 TGW funding compared to contract values at target and explain the differences. Also provide the FY 1988 and FY 1989 unobligated balances and forecast obligations to consume them.

Answer. The requested funding for FY 1988 to FY 1991 follows:

Army Funding for MLRS–TGW (As of Dec. 31, 1988):

Fiscal year:	*Millions*
1988	$23.6
1989	36.0
1990	47.2
1991	47.2

Army Target Costs for MLRS–TGW Development Contract (40 percent of MOU Costs) and Integration Contract:

Fiscal year:	*Millions*
1988	$17.2
1989	25.6
1990	35.8
1991	40.8

The differences between the Army budgeted funding and the contract values are the costs for in-house technical support and program management, and the costs for use of test range facilities.

The FY 1988 unobligated MLRS–TGW program funding balance is $484 thousand. This is expected to be obligated by the end of April 1989. The unobligated funds for FY 1989 are $29.993 million. The program plan to obligate these funds is:

[In millions of dollars]

Contract	Amount	Date
Development (MDTT)	$21.000	April 1989.
Integration (LTV)	5.100	April 1989.
In-House	1.089	July 1989.
Other Govt Agency	2.804	July 1989.

HELICOPTER MODERNIZATION

Question. Sunday's Post contained an article stating "The Army's $14 million front-line attack helicopter is plagued with so many problems that a commander has told superiors that he would rec-

ommend flying Vietnam-era AH-1 Cobra gunships into battle instead of the newer AH-64 Apaches."

Dr. Sculley, press articles are often misleading. What did the Commander of Ft. Bragg's Aviation Brigade really say?

Answer. The Commander stated he was disappointed in the AH-64 Apache reliability and availability experienced by his unit.

Question. What were the results of the exercise in which the AH-64's allegedly had so many problems?

Answer. The exercise in question consisted of 12 AH-64's and crews. The mission of the exercise was to conduct crew gunnery qualification.

The aircraft experienced problems particularly with the 30 mm gun which consisted of jamming and broken shear pins. The mission was successful despite the problems. All aircraft crews were qualified.

Question. Are there problems with: jamming of the cannon; motor burn-out; cracked rotor blades; or excessive vibrations that interfered with electronics.

Answer. 30mm gun (cannon). Jamming of the 30mm gun is primarily attributed to the ammunition carriers which move the ammunition from the drum through a flexible chute and into the gun. Older carriers have problems with ammunition binding in the flexible chute causing gun stoppage particularly when the ammunition is not loaded precisely. An improved carrier is on hand and being incorporated into production and retrofitted to the fielded fleet. Currently, the carriers are being replaced on an attrition basis. The Army will evaluate the need to accelerate replacement.

Motor Burn Out. The gun motor has not been problematic. Two instances of motor failures experienced by one unit are being analyzed presently.

Cracked Rotor Blades. Some debonding of the fiber glass on main rotor blades has been experienced. The cause has been determined and corrected on production aircraft. Teams in Europe and the U.S. are making fixes to fielded aircraft. These corrective actions should be completed by 30 April 1989.

Vibration. Gun induced vibration has caused premature circuit breaker tripping. The fix consists of a rubber grommet and a grounding wire. The modification to install this fix is presently pending approval.

Question. Turning to the budget, how much is requested for continued R&D in FY 1990 on AH-64's and UH-60's? How will these funds be used?

Answer. The President's budget requests $84 million in FY 1990 for AH-64 R&D. The funds are for the AH-64 Multi-Stage Improvement Program which is an evolutionary upgrade program. Improvements are keyed to expanding AH-64 warfighting capabilities and extending operational life. MSIP will include improved fire control, air-to-air combat capabilities, reduced pilot workload, better hover control, along with increased reliability, availability, maintainability and survivability.

The President's budget requests $26 million in FY 1990 for UH-60 R&D. These funds are programmed for the UH-60 Multi-Stage Improvement Program.

Question. What is the status of AAWWS (Airborne Adverse Weather Weapon System), the new radar for AH-64's and LHX?

Answer. The program is 70 percent complete with a 46 month Proof of Principle contract as of 1 April 1989. Proposals for the Initial Design Phase (IDP) of Development/Production Proveout Phase have been received from the Martin Marietta/Westinghouse Joint Venture. IDP contract award is scheduled for August 1989. A study is funded in the LHX Demonstration/Validation Phase to analyze integration of AAWWS onto an LHX sized platform.

Question. Describe the results of tests to date.

Answer. Thru March 1989, the following major tests have been completed:

AAWWS Hellfire Wind Tunnel Test: successfully provided aerodynamic characteristics to validate Missile Command and contractor flight simulator programs.

AH-64 Aerodummy Flight Test: Demonstrated that the APACHE could perform within its flight envelope with the size AAWWS mast mounted assembly installed.

AH-64/AAWWS Hellfire Launch Transient Test: Demonstrated that the Hellfire missile can be safely launched from the APACHE during hovering and forward flight.

Fire Control Radar (FCR) Tower Test: Obtained data for the development of all of the FCR operational modes. Predicted performance verified.

Seeker High Speed Captive Flight Test: Provided development data and verification of seeker tracking modes. Predicted performance verified.

Hardware in the Loop (HWIL): The HWIL test initially demonstrated the accuracy of the laboratory simulation for the missile, and is being used to verify the functioning of each seeker prior to firing.

Inertially Guided Test Vehicle (IGTV) Missile Firing: Demonstrated the predicted accuracy of the inertially guide phase of the missile flight profile.

AH-64/AAWWS Integration: AAWWS Proof of Principle design has been integrated with first flight scheduled 13 April 1989.

Question. What activity will occur in FY 1989 and FY 1990?

Answer. The AAWWS Proof of Principle (POP) activities are as follows:

FY 1989: AH-64/AAWWS flight test (2 aircraft), April–June 1989; first full-up radar-guided missile firing, April 1989; complete high speed captive flight test, July 1989; four radar-guided missile firings, August–September 1989.

FY 1990: Complete developmental flight test, October 1989; fire last development RF missile, October 1989; early user test and experimentation, October–December 1989.

The initial design phase (IDP) activities are as follows:

FY 1989: IDP contract award, August 1989.

FY 1990: System design review, November 1989; hardware preliminary design review March 1990; software specification review, May 1990; software preliminary design review July 1990.

Question. How will the $89 million in Fiscal Year 1990 be used?

Answer. $77.9 million will be placed on the Initial Design Phase (IDP) Contract. The balance of $11.1 million will fund government support functions.

Question. Is AAWWS ready for full engineering development?

Answer. Yes, the results of the Critical Technical Demonstration Phase as well as the current testing to date, demonstrate that design objectives have been met.

Question. Provide the deployment plan for AAWWS equipment.

Answer. The Initial Basis of Issue Plan (IBOIP) is currently being developed, with expected completion in May 1990. The current plan is to equip 322 Apaches. This is approximately ⅓ of the planned fleet.

Question. For the record provide funding in each fiscal year 1988 to 1991 for AH-64, UH-60 and AAWWS compared to contract target values and explain differences. Also explain unobligated FY 1988 and FY 1989 unobligated balances and forecast obligations to consume them.

Answer.

[In millions of dollars]

	Fiscal year—			
	1988	1989	1990	1991
AH-64 Apache:				
Funding	28.7	49.5	84.3	61.1
Contract	17.3	43.4	78.9	55.1
Difference	11.4	6.1	5.4	6.0

Difference:

FY 1988: 1.6 in-house personnel and engineering support 9.8 classified program

FY 1989: 8.6 in-house personnel and engineering support 2.5 internal reprogramming.

FY 1990: 5.4 in-house personnel and engineering support.

FY 1991: 6.0 in-house personnel and engineering support.

AH-64 RDTE FY 1988 unobligated balance = 0.

AH-64 RDTE FY 1989 unobligted balance = $40.3 million (as of 30 March 1989).

Multistage improvement program—obligate June 1989—$35.3 million.

Fire control computer contract—obligate April 1989—$2.0 million.

In-house personnel—obligate April to September 1989—$1.1 million.

Engineering support—obligate April to September 1989—$1.9 million.

[In millions of dollars]

	Fiscal year—			
	1988	1989	1990	1991
UH–60 Black Hawk:				
Funding	14.9	40.7	26.2	11.8
Contract	14.2	39.5	25.3	7.4
Difference	0.7	1.2	0.9	4.4

Dollar difference will be used for in-house management and government testing.

The fiscal year 1988 and 1989 unobligated balances are $14.2 million and $40.5 million respectively. The Multi-Stage Improvement Program which this funding supports is still under review at Department of the Army. Funds can be obligated within 30 days after program approval.

[In millions of dollars]

	Fiscal year—			
	1988	1989	1990	1991
AAWWS:				
Funding	79.8	85.6	112.2	147.0
Contract	75.3	74.3	91.5	134.5
Difference	4.5	11.3	20.7	12.5

Explanation of difference:

FY 1988:	
In-house and GFE	4.5
FY 1989:	
In-house and GFE	9.3
Radio frequency interferometer (RFI)	2.0
FY 1990:	
Risk reduction-software mode development/Ada conversion	8.1
RFI	1.5
In-house and GFE	11.1
FY 1991:	
In-house and GFE	12.5

FY 1988: Unobligated-0.2; forecast, June 1989, in-house/GFE.
FY 1989: Unobligated-8.0; forecast, August 1989, IDP contract.
FY 1989: Unobligated-2.0; forecast, April 1989, RFI.
FY 1989: Unobligated-1.0; forecast, August 1989, in-house/GFE.

NEW SURFACE TO AIR MISSILE

Question. The budget requests $4.7 million for a new start program to develop a new surface-to-air missile system to replace Chaparral and Hawk.

What are the deficiencies of Chaparral and Hawk?

Answer. Both systems are very manpower intensive for the amount of firepower each system provides. CHAPARRAL is also limited by range and command and control capabilities. HAWK is equipment intensive and will require greater mobility on the future battlefield.

Question. Why is a new missile development, rather than a product improvement, thought to be necessary at this time?

Answer. The Army is considering whether to continue with further product improvements to the existing systems or to acquire a new medium range missile system. Improvements to the existing systems are preferred as long as this modernization approach is viable; however, design trade-off studies are required to determine which approach is best for the Army.

Question. The Marines are requesting R&D for Hawk upgrades. Do they agree with you on the need for a new missile system?

Answer. While the Army has no current requirement for a new medium range missile system, the Marines do have a requirements document for a Medium Surface to Air Weapons System (MSAWS) to replace HAWK.

Question. Explain Army plans for Hawk upgrades. How much is requested in FY 1990 for this purpose?

Answer. The Army has two major upgrades currently planned for HAWK. The Phase III Product Improvement Program: significantly increases the system's firepower with a simultaneous engagement capability; increases system reliability, availability, and maintainability; adds an onboard operator trainer; upgrades track reporting capability; and enhances mobility and operations in a chemical environment. Phase III is in the fourth year of Production and $28.8 million (MIPA) has been requested in FY 1990 to procure 10 kits. The Army is also developing improved maintenance equipment to support Phase III HAWK. $3.8 million (RDT&E) has been requested in FY 1990 for development of this improvement.

The Army is upgrading HAWK's mobility with the Mobility Enhancement program. This product improvement, which is a codevelopment effort with the Marine Corps and The Netherlands, will reduce the number of vehicles in a fire unit by 50 percent and improve launcher reliability, availability, and maintainability. $8.0 million (RDT&E) has been requested in FY 1990 for development of this improvement.

Question. What is the total development cost of the new missile?

Answer. The Army has not conducted a cost analysis of a new medium range missile development.

Question. What would be the characteristics of the new missile, and how would it differ from current ones?

Answer. A new missile system would have greater firepower and mobility capabilities with reduced manpower and supportability requirements.

Question. What priority does the Army attach to this program?

Answer. The development of a new medium range missile system is a low priority and will remain so until a requirement for such a system is defined.

Question. Has JCS approved the new missile requirement?

Answer. JCS has not addressed such a requirement; however, OSD approved a Justification for Major System New Start (JMSNS) for a Medium Surface to Air Missile (MSAM) system in 1986.

Question. How will the Marine Corps participate in this program?

Answer. The Marine Corps has participated in the acquisition of all HAWK product improvements. If the Army determines that a new missile system is required, the Army will work closely with the Marines to develop a system that meets the requirements of both Services.

ADVANCED ANTITANK WEAPON SYSTEM—MEDIUM

Question. The Army recently concluded a competition to design the new Advanced Antitank Weapon System Medium (AAWS–M) with fire and forget technology. The Army requests $158.9 million if FY 1990 for AAWS–M R&D. Please discuss the rationale of your recent decision. Affordability was rumored to be the biggest draw back of the fire and forget technology. How is this concern addressed in your competition?

Answer. The Army just completed a successful Proof of Principle (POP) for AAWS–M. During the POP the Army evaluated three guidance technologies: Imaging Infrared Fire and Forget (Texas Instruments), Fiber Optics (Hughes Aircraft), and Laser Beam Rider (Ford Aerospace). The Army and the Marine Corps considered four areas in the AAWS–M selection. In priority order, they are: Operational Effectiveness/Technical; Cost/Price; Integrated Logistics Support/Maintainability; and Management/Production. The Source Selection Authority (SSA) selected the system that represents the best value to the government. The SSA selected Fire and Forget and the preferred technology on 9 February 89. As for affordability, the updated AAWS–M life cycle cost for a buy of 5000 command launch units and 58,000 missiles is projected to be $8.7 billion. The system is considered affordable and will be supported in the budget process.

Question. Congress appropriated $5.4 million the Army in FY 1989 for Dragon III, which the Marine Corps recently terminated. How will these funds be used?

Answer. The Army sent all but $0.3 million of the above funds to USMC; they are in the process of negotiating termination costs for the DRAGON III contract. USMC estimates that termination cost will be in the range of $8–$14 million. The DRAGON III funds (FY 1989) will be used to pay these termination costs.

Question. The Commandant of the Marine Corps does not think that an "interim" antitank weapon—such as the MILAN or Bofors BILL—is necessary to bridge the gap until AAWS–M arrives. General Pihl, what is the Army's opinion?

Answer. I agree with General Gray. We have evaluated MILAN and BILL as candidates for a supplemental interim medium antitank system for our contingency forces while AAWS–M is in development. It is my opinion that neither MILAN nor BILL are operationally suitable for employment in these types of units. We need a single man portable medium system; both MILAN and BILL are clearly medium-plus crew served weapons. We are in the process of enhancing the DRAGON to a DRAGON GEN II with an improved warhead. DRAGON II will not satisfy the AAWS–M requirement, but it will provide an operationally suitable band-aid fix until AAWS–M is fielded.

Question. How will the FY 1990 funds be used?

Answer. $134 million of the $158.7 million FY 1990 request will be provided to support the prime contract efforts in the AAWS–M Full Scale Development (FSD) program. In FY90 we will complete production prove-out testing, initiate preproduction qualification testing, and begin the man rating process for AAWS–M. Additionally, we will continue our insensitive munitions and alternate warhead programs. The remaining funds will be used to fund in-house support, other government agencies, and support contracts.

Question. When will the first AAWS–M's be fielded to combat units?

Answer. The first unit equipped (FUE) for AAWS–M is 2QFY94.

Question. Provide the funding in FY 1989 and FY 1990 for AAWS–M, compare to contracts at target, and explain differences in detail.

Answer. Out of the $108.716 million in FY 1989 funds received by AAWS–M, $80 million has been stipulated in the model contract as the amount to be provided to the contractor. The remainder will be used to fund additional contractor work (e.g. advanced warhead efforts), in-house (MICOM) support (e.g. program management and insensitive munitions efforts) and other government agencies supporting AAWS–M.

$133.966 of the $158.694 million FY 1990 request for AAWS–M will be provided to support the FSD prime contract. As with FY 1989 funding, the remainder of the FY 1990 funds will be applied in the areas of additional contractual efforts, in-house support and the support of other government agencies.

The difference between the amount of money provided for this program in the FYDP and the current program cost estimate (revised to take into account contractual proposals) was minor. The actual year-by-year differences, if any, cannot be determined until after the program proceeds through its Defense Acquisition Board (DAB) review (since additional direction may be given to modify the effort) and the contract is signed.

Question. Provide the status of FY 1988 and FY 1989 AAWS–M unobligated funds and forecast obligations to consume them.

Answer. All but $.272 million of FY 1988 AAWS–M funds have been obligated. The remainder will be obligated in May 1989. With respect to FY 1989 funding, $9.378 million has been obligated. The remaining $99.338 million will be obligated in June 1989. The bulk of this amount will be obligated against the AAWS–M full scale development prime contract.

LOCKOUT DEVICES

Question. Technology exists to put "lockout" devices on U.S. weapons in order to make them ineffective should they fall into the hands of terrorists.

In FY 1987 and FY 1988, the Committee expressed a desire for the Army to incorporate such devices on the Stinger missile. How has the Army complied?

Do any Stinger's fielded today have such protection? Do any missiles fielded today have a "lockout" device?

What is your plan to incorporate lockout technology that you developed into Stinger production missiles?

Answer. In the National Defense Authorization Act FY 88/89, Congress directed the Army to demonstrate and test alternative electronic safety devices that can be installed or retrofitted on Basic and RMP Stinger missiles and report the results of the demonstration and testing to Congress.

General Dynamics conducted a successful demonstration of the safeguard device for Basic Stinger at White Sands Missile Range in January 1988.

The details of the Basic Stinger security interlock approach and demonstration, as well as the details of the Stinger-RMP approach were provided in a report to Congress in July 1988. The report also provided contractor cost and schedule estimates to implement both interlock systems, excluding Government costs.

General Dynamics successfully demonstrated the Stinger-RMP safety interlock device during the week of October 9, 1988. Results of the demonstration will be provided to Congress by May 1989.

The Army's position is that an interlock device is not needed for Stingers in the U.S. Army inventory since adequate physical security and controls exists for Army missiles. However, the most viable application of an interlock device is for Stinger missiles which are transferred to other countries through intelligence challens. These missiles are more susceptible to being lost and used as "terrorist weapons".

ARMY TACTICAL MISSILE SYSTEM

Question. The Army requests $46.8 million in FY 1990 to finish ATACMS development. What is the status of the ATACMS development program?

Answer. The ATACMS program completed Engineering Design Test—Contractor (EDT–C) on February 24th with the ninth and tenth missile flights. The first missile flight of Development Testing is planned to take place on March 31st. Fourteen missiles will be flown in Development Testing which is scheduled to end in August. Initial Operational Test and Evaluation (IOTE) is scheduled to begin in September 1989. We plan to fly fifteen missiles in IOTE.

Question. How will FY 1990 funds be used?

Answer. The FY 1990 ATACMS RDTE funds will be used to complete the IOTE, fund Design to Unit Production Cost (DTUPC) award fees, complete the component and software validation, and complete the Tech Data Package.

Question. The Army's Selected Acquisition Report to Congress as of December, 1988 states: "The Army is currently working to complete a study which defines the total Army TACMS requirement." Why is there uncertainty?

Answer. There is uncertainty in the total requirement of some of these weapons systems because some targets can be attached by several different munitions. With uncertainty as to the development or production of any of these systems, it is difficult to pick just one number and say "This is it." Even with certainty as to the procurement of these other systems, it is not an easy task to project the availability of assets and then the most cost effective munition to attack each target throughout the theater. Then, when

we expand the problem by acknowledging that certain of these targets will be attacked by the Air Force, we further increase the difficulty of the problem. Having said this, the Army has established a world-wide requirement of 2834 Block I Army TACMS missiles. This assumes that the Air Force will attack certain targets and that the Army buys certain other deep attack munitions such as Ground Launched Tacit Rainbow. This total requirement is subject to change if those assumptions change.

Question. What subcontractor problems have been encountered.

Answer. The only subcontractor problem of any significance involves the control actuator system or CAS, which takes the commands from the guidance control unit and "steers" the missile. The original subcontractor, Singer, decided not to continue into the production phase of the contract. There was nothing functionally wrong with the Singer CAS; in fact, it has been used on each of the missile flights to date. The problem Singer encountered centered around the producibility of its design. As a result of Singer's decision, the Prime Contractor, LTV, contracted with Simmonds to produce a replacement CAS. We believe that this is a low risk change. We have not had a CAS related failure to date, and we delayed the Low Rate Initial Production decision until after Simmonds had demonstrated the new CAS in LTV's hardware-in-the-loop simulator using actual flight data. Eight of the fourteen missiles flown in development testing will have the new CAS and all fifteen missiles flown in operational testing will have the new CAS. We are confident that this change will not affect the progress of this program.

Question. Last year, Congress added funds for "ATACMS Block II"—an infrared anti-armor submunition—although it was not discussed in our hearing.

What is ATACMS Block II?

Why is it needed?

How does it differ from the Terminal Guidance Warhead submunition for the MLRS?

What is the total development cost?

What is the status of the FY89 funds?

Answer. Block II is the Army's "Deep Fires" program for the attack of armored maneuver forces. It consists of a deep attack missile carrying a "smart," Terminally Guided Submunition (TGSM). The targets for Block II are Armored Combat Vehicles, which include tanks, BMP's, BTR's, other infantry fighting vehicles, and accompanying self propelled artillery.

The reasons that we need Block II is that the mathematics tell us that we will be unable to service all of these targets in the close battle. Therefore, while the brigade and division commander are fighting the close battle, the Corps Commanders will use Block II to attack the follow-on divisions of the lead or committed Army to upset the threat correlation of forces, disrupt his tempo of operations, and ultimately influence the close battle.

The Terminal Guidance Warhead submunition being developed for the MLRS is a candidate to become the submunition for Block II. Another candidate is the Infrared Terminally Guided Submunition for which the Congress provided funds last year. Both submunitions perform essentially the same function but with different

seeker technologies. Our intention is to carry the candidate submunitions through the same level of development, and then decide from among them, which one we will put in each carrier. These technologies are not sufficiently mature to make this decision now; therefore, we will make this "neck-down" decision in fiscal year 1992 after each has completed its demonstration/validation phase of development.

We now estimate that the total full scale development cost for ATACMS Block II with an Infrared Terminally Guided Submunition will be approximately $440 million.

Last year, Congress gave the Army $10 million to initiate a Block II program for the ATACMS. We have added to that amount in fiscal year 1990 and 1991 to build a 24 month proof of principle program to demonstrate an Infrared Terminally Guided Submunition for the ATACMS. We will use the data collected during this proof of principle demonstration to select the Block II submunition in the "neck down" decision I referred to earlier. The Request For Proposal for this proof of principle demonstration was released in February. We expect to award proof of principle contracts to two contractors in August 1989.

It is worth pointing out that the seeker technology developed during the Infrared Terminally Guided Submunition proof of principle phase will also be evaluated for its ability to be hardened for use in guns and mortars. This would provide us the potential of having a common infrared seeker for both missiles and rockets, and guns and mortars.

Question. For the record, provide FY 1989 and FY 1990 funding for ATACMS, compare to contract values at target, and explain the differences in detail. Also, indicate the unobligated FY 1988 and FY 1989 funds and forecast obligations to consume them.

Answer. The FY 1989 and FY 1990 funding requirements for ATACMS are as follows:

[In millions of dollars]

	Fiscal year—	
	1989	1990
Contracts:		
Missile (KA036)	$39.0	$14.3
Integration (KA037)	17.0	7.2
DTUPC award fee	1.6	4.9
Program Mgmnt Support	.2	
Program Mgmnt Engineering	.2	.2
C3 Support Contract	.1	
DTAP (Classified Program)	1.0	
FDDM	1.0	
PEP	2.9	
Other Contracts	2.9	
Total Contracts	65.9	26.6
Other Government Agencies	16.4	14.1
In-House Missile Command Support	9.9	6.1
Total Requirement by Fiscal Year	92.2	46.8

The Missile Contract has a target price of $183.0 million and a ceiling price of $206.4 million. The Integration Contract has a target price of $96.4 million and a ceiling price of $109.7 million. There is a total of $28.9 million in FY 1989 and $5.6 million in FY 1990 to complete the payment of the missile contract to target. There is $11.4 million in FY 1989 and $4.1 million in FY 1990 for the payment of the integration contract to target. There is a total of $18.8 million in FY 1989 and FY 1990 to pay the difference between the target and completion cost of the missile contract. There is a total of $8.7 million to pay the difference between the target and completion cost of the integration contract. We do not expect either contract to go to ceiling.

Consistent with guidance contained in the FY 1989 Appropriations Act, the Army TACMS program used unobligated FY 1988 funds to pay FY 1989 requirements. This is how the Army is able to fund FY 1989 requirements that exceed the FY 1989 appropriation.

Using FY 1988 funding to pay FY 1989 requirements has enabled the program to fully obligate FY 1988 funds. The Army TACMS program has obligated $44.0 million of the $76.4 million appropriated in FY 1989. Of the remaining $32.4 million, $0.4 million is being held by OSD as an inflation adjustment, $0.9 million has been reprogramed for Small Business Innovative Research, $1.4 million has been reprogramed to the Operational Test and Evaluation Agency to pay operational test costs, and $2.9 million has been fenced for Producibility Engineering Proposals, and $9.1 million is for a variety of small contract and award fees which the program plans to obligate by 1 August. The program expects to begin obligating the $15.7 million to pay the costs over target during the third quarter FY 1989 and expects to award the $1.6 million Design to Unit Production Cost Award Fee in the first quarter FY 1990.

ANTI-TACTICAL MISSILE PROGRAM

Question. Explain the Army's anti-tactical missile program.

Answer. The Army's anti-tactical missile program is called Joint Tactical Missile Defense (JTMD). JTMD is an Army-led joint developmental program designed to counter the Soviet tactical missile (TM) threat: short-range ballistic missiles (SRBMs), cruise misiles and air-to-surface missiles armed with conventional, chemical and nuclear warheads. Defeating the TM threat requires capabilities beyond those currently deployed with operational forces. To counter the TM threat, a synergistic mix of offensive and defensive measures to counter the total enemy system is required. TMD consists of four key elements: active defense—destroy TMs in flight; passive defense—degrade the enemy's ability to target friendly forces, reduce vulnerability to enemy attack, and reconstitute the capability to conduct combat operations following an attack; attack operations—destroy or disrupt TM launchers or their supporting C2 and logistical structure; and communications, command and control, and intelligence—provide early warning, predictive intelligence, resource allocation and near-real-time targeting to forces conducting TMD operations. These capabilities include launch detection, rapid dissemination of attack warning to friendly forces,

destruction of large numbers of missiles in flight, and attack of large numbers of dispersed, mobile TM systems that present few detectable signatures. TMD provides protection of critical forces and assets, and gives commanders freedom of maneuver.

Question. How will the FY 1990 funds be used?

Answer. The FY 1990 funds of $36.1 million include $15.8 million for PATRIOT PAC–2 development and testing efforts and $20.3 million for non-PATRIOT TMD activities. The PATRIOT PAC–2 activities include hardware and software efforts. The TMD funds will be utilized for concept analysis and requirements definition in each of the four TMD elements, to continue technology studies in cooperation with other Army and defense agencies, to continue development and enhancement of analysis tools, and to conduct experiments. These activities will serve to identify the discrete programs/systems that will be integrated to counter the TM threat.

Question. Explain the PATRIOT and HAWK missile upgrades that are funded in the budget, and how they relate to this initiative. In particular, explain the "PAC" upgrades for PATRIOT and the Advanced Tactical PATRIOT initiatives.

Answer. The "PAC" (PATRIOT Anti-Tactical Missile (ATM) Capability) upgrades consist of Phase 1 (PAC–1) and Phase 2 (PAC–2). PAC–1 is a software modification of PATRIOT surveillance capabilities to provide a self defense capability for PATRIOT fire units. Under PAC–1, PATRIOT can engage and kill TMs. PAC–2 expands upon the PAC–1 capability through hardware changes in the warhead and fuze. An initiative that builds upon the PAC–1 and PAC–2 capabilities is the Multi-Mode Seeker Demonstration. The demonstration of this technology is a Nunn Amendment cooperative R&D effort with the Federal Republic of Germany (FRG). This development incorporates an active radar into the PATRIOT missile seeker and improves PATRIOT's capability against TMs by increasing the number of simultaneous engagements, improving the system's ability to intercept lower Radar Cross Section targets, and enlarging PATRIOT's area coverage against TMs.

The PATRIOT Product Improvement Program, funded under Program Element 0203801A, consists of developments that primarily improve PATRIOT's capability to detect low Radar Cross Section targets and to counter the anti-radiation missile (ARM) threat. These upgrades will enhance PATRIOT's anti-tactical missile capabilities by permitting detection of tactical missiles at greater ranges and increasing PATRIOT's survivability against ARMs.

The HAWK Product Improvement Program, funded under Program Element 0203801A, consists of upgrades to HAWK maintenance equipment and of mobility enhancements. The mobility enhancement program is a cooperative effort with the US marine Corps and the Netherlands. The Army's funding of this program is supplemented with Nunn Amendment funding. These developments are unrelated to the JTMD program.

Question. Concerning Advanced Tactical PATRIOT (ATP): Does the Army have an approved operational requirement for improvements to the PATRIOT system beyond those funded in the "PAC–2" project?

Answer. The Army does not have a program called Advanced Tactical PATRIOT; this name was coined by industry. The Army is

planning for PATRIOT growth through the Preplanned Product Improvement Required Operational Capability (ROC) and the Operational and Organizational (O&O) Plan for the Active Tactical Missile Defense System. The ROC will provide the basis for the incremental improvements to the PATRIOT system, including the Multi-Mode Seeker. The O&O Plan will update and further define the operational requirements for further upgrades to PATRIOT. Both of these documents are being staffed.

Question. Have the US and West German governments signed a Memorandum of Agreement on the ATP program?

Answer. Again, the US and FRG do not use the term "ATP". The US and West Germany have agreed to the text and content of an umbrella Memorandum of Agreement (MOA) for Extended Air Defense and have additionally agreed to the initial annex to this MOA for the Multi-Mode Seeker Demonstration. Current projections are for signinig the MOA on 14 April 1989.

Question. Has the Army programmed adequate funding in the five year plan to complete ATP development?

Answer. The Army has programmed adequate funding to complete Full Scale Engineering Development of a PATRIOT Multi-Mode Seeker.

Question. Described the tests conducted to date, their results, and plans for future tests.

Answer. Test activity to date has been in the PAC–1 and PAC–2 areas. There have been nine flight tests supportive of the development of the PAC–1 and PAC–2 efforts. All of these tests have been successful. The tests were conducted against various surrogates demonstrating target profiles which emulate Warsaw Pact missiles. Intercept characteristics ranged from low to high altitude in both benign and ECM background conditions. Future testing includes five additional PAC–2 flight tests against threat TM surrogates and air breathing threats in an ECM environment. Under the Multi-Mode Seeker demonstration, four prototype missiles will be launched. The testing is scripted to evaluate the PATRIOT missile in stressing environments, against stressing targets.

Question. For the record, provide the funding by appropriation and line item for all HAWK, PATRIOT, and ATP initiatives in the FY 1990 budget in each fiscal year 1988 to 1994.

Answer. The funding is:

[In millions of dollars]

Program element	Project number	Title	Fiscal year—						
			1988	1990	1990	1991	1992	1993	1994
0603302A	D099	JTMD	0.3	12.7	20.3	28.8	45.5	87.0	0.0
	D141	Patriot-ATM	21.5	18.6	15.8	6.2	0.0	0.0	0.0
0203801A	D036	Patriot PIP	18.3	22.6	39.2	29.2	36.9	24.4	22.7
	D690	Hawk PIP	10.9	15.9	11.8	9.0	12.2	0.0	3.0
NATO COOPERATIVE R&D PROGRAM (NUNN)									
063790D	P790	Patriot Multi Mode Seeker	0.0	25.0	20.2	0.0	0.0	0.0	0.0
		Hawk Mobility Enhancement	3.1	4.5	0.0	0.0	0.0	0.	0.0

SENSE AND DESTROY ARMOR (SADARM) SUBMUNITION

Question. SADARM is an anti-artillery submunition for MLRS. Army requests $155 million for continued R&D in FY 1990. What is the status of the SADARM development program?

Answer. The SADARM development effort is currently transitioning from component/subsystem development to higher level integration & testing. Technical tests are scheduled to begin in the 3rd Quarter, FY 1990 for the 155mm SADARM. The MLRS SADARM Engineering Development Contract was awarded to LTV in September 1988 and is in the early stages of component development.

Question. What guidance did the Defense Acquisition Board previde during its most recent review of SADARM?

Answer. In May 1988, the Defense Acquisition Board:

Approved SADARM to proceed through milestone IIB for the 155mm howitzer and MLRS applications.

Directed two sizes of submunitions to be developed to maximize lethality against the full spectrum of armored targets.

Directed a joint OSD/Army study to be conducted on the cost-effectiveness of 203mm howitzers to determine whether the SADARM program should include a 203mm howitzer application.

Directed the Army to increase its efforts toward cost reduction and control by: closely scrutinizing achievement of production cost objectives as development proceeds; keeping options open to compete both contractors' submunitions until a clear choice can be made on the best production strategy; exploring ways to control full-scale development cost; solidifying plans to compete follow-on production of MLRS SADARM rockets; and analyzing the benefits of applying "could cost" techniques.

Encouraged the Army to obtain Allied cooperation in fielding SADARM.

Directed the Army to plan realistic testing of SADARM component capabilities and conduct end-to-end testing of the complete SADARM delivery system.

Question. How will the FY 1990 funds be used?

Answer. The FY 1990 funds will be used to procure long lead hardware to support technical and operational testing; to start 155mm SADARM projectile technical testing; to conduct a 155mm Force Development Test and Evaluation; and to continue MLRS SADARM dispenser development.

Question. For the record, provide: SADARM funding in each fiscal year 1988 to 1994; a breakout of SADARM contracts at target in those years; an explanation of the differences in FY 1988 to 1991; and unobligated balances in FY 1988 and 1989 and forecast of obligations to consume them.

Answer. SADARM funding by fiscal year is:

[In millions of dollars]

	Fiscal year—						
	1988	1989	1990	1991	1992	1993	1994
RDTE funding	101.3	143.9	155.0	104.5	26.5	7.8	24.7
Procurement funding:							
155mm SADARM projectile					35.2	97.5	156.5
MLRS SADARM rocket					155.3	306.7	362.4

MAJOR SADARM CONTRACT BREAKOUT—OBLIGATIONS BY FISCAL YEAR

[In millions of dollars]

Honeywell	32.5	[1]41.9	(*)	(*)	(*)	(*)	0
Aerojet	34.5	[1]43.0	(*)	(*)	(*)	(*)	0
LTV	4.5	14.8	15.8	16.7	14.0	4.8	0

* Contract modifications for Honeywel and Aerojet are currently being negotiated to reflect Defense Acquisition Board decisions, and Congressional direction to increase the submunition development program to a minimum of 60 months.

There were no differences in funding in FY 1988 and FY 1990. Congress directed that SADARM be funded at $154 million in FY 1989; however, funding appropriated in the Program Element was $145.6 million. The Army was directed to fund the balance through reprogramming action. Contract modifications will lower the financial needs of the two prime submunition contractors through the balance of FY 1989 as a result of lengthening the submunition engineering development phase, and enable the SADARM program to operate at the lower funded level in FY 1989. In FY 1991, the current RDTE budget is $104.5 million versus a revised September 1988 Baseline Cost Estimate of $128.9 million to reflect the May 1988 Defense Acquisition Board decision and the Congressionally lengthened engineering development program.

FY 1988 has zero unobligated balances. As of 28 February 1989, $88,665,000 of FY 1989 SADARM funding has been obligated from a total FY 89 program of $143,917,000. The forecast of cumulative obligations for the balance of FY 89 ($ millions) is:

	Millions
March	$102.7
April	109.5
May	112.1
June	141.2
July	143.8
August	143.9
September	143.9

TACIT RAINBOW

Question. The Army requests $57.7 million for engineering development of ground launched Tacit Rainbow, the loitering anti-radar missile. Explain the requirement for Army's Ground Launched Tacit Rainbow missile.

Answer. The requirement for the Ground Launched Tacit Rainbow (GLTR) is contained in the 15 December 1988 approved Joint Services Operational Requirements (JSOR) document. The intent is to provide the Army with an MLRS launched ———. The system is required to support the Army's Air-Land Battle doctrine and must

maximize commonality with the air-launch variant, consistent with meeting JSOR requirements.

Question. The parent program, Air Launched Tacit Rainbow, did not have a successful contractor flight test program. Why is it wise to proceed with the ground launched derivative at this time?

Answer. The Air-Launched Tacit Rainbow (ALTR) program has just recently completed Contractor Development Test (CDT). During this testing, problems were found with the air-launched vehicle that have subsequently been corrected. CDT is designed to identify problem areas and have them corrected. These problems are not expected to recur. CDT, did however validate the soundness of the ALTR design. The ——— now is the time to initiate the GLTR development program.

Question. What is the status of the Army Tacit Rainbow development program? Specifically, what have been the results of tests?

Answer. The GLTR is currently in source selection for the GLTR Full Scale Development (FSD) contract award. As such, no testing for the GLTR program has taken place yet.

Question. How will the FY 1990 funds be used?

Answer. The FY 1990 funds will be used to complete the initial hardware and software design of the baseline configuration missile. A critical design review will be completed leading to the fabrication and assembly of prototype hardware. Producibility planning activities will be initiated. In addition, the integration of the missile into the MLRS system, including software development, will be initiated.

Question. Explain how the Army's variant of the missile differs from the Air Force missile. Specifically address redesign of the missile to fit into MLRS launchers.

Answer. The approved JSOR requires the Army's GLTR be launched from the MLRS to preclude any Army force structure increases. ———. The ALTR cannot satisfy this requirement. As a result, the external shape of the GLTR will differ from the ALTR. The program strategy is to repackage any internal components requiring it to fit the new shape, while maintaining maximum commonality with the ALTR. In addition, some unique Army requirements will be implemented to include both a larger payload capability and increased navigational accuracy.

Question. Explain the internal navigation system for the Army missile compared to the Air Force version, why do they differ?

Answer. Since the GLTR FSD program is currently in source selection, the composition of the Army GLTR navigation system is unknown. ———.

Question. Given the need to redesign the missile, why not just use Seek Spinner missiles?

Answer. The Seek Spinner missile design cannot fit into the MLRS launcher and is a non-certified round requiring fueling, etc., in the field. To use the Seek Spinner would require a major change to the force structure for the U.S. Army.

Question. For the record, provide: Army Tacit Rainbow funding in each fiscal year 1988 to 1994; a breakout of Tacit Rainbow contracts at target in those years; an explanation of the differences; and detailed milestones for the program.

Answer.

FUNDING

	Fiscal year—						
	1988	1989	1990	1991	1992	1993	1994
RDT&E	0	0	57.7	72.7	79.8	83.6	32.7
PROCUREMENT	0	0	0	0	32.3	97.9	120.0
Total	0	0	57.7	72.7	112.1	181.5	152.7

RDT&E (ESC$) CONTRACTS

	Fiscal year—				
	1990	1991	1992	1993	1994
MSL FSD contract	26.3	32.9	40.7	41.0	11.2
Sys Integ contract	8.2	10.1	12.8	14.4	4.4
Support contract	2.6	5.3	3.9	4.0	3.4
Procurement (ESC$) Contracts					
NON-REC			32.3	18.8	18.6
REC				70.5	90.2

DIFFERENCES

The differences between the contract funding and total funding are used for hardware in-the-loop simulation support, range instrumentation, and test targets, in-house and other Government lab support; and project management salaries.

MILESTONES

	Fiscal year
Joint program decision	1Q—1987
Joint aquisition strategy approved	2Q—1988
Weapons trade Studies Contract Award	3Q—1988

STINGER MISSILE

Question. We recently discussed with the Marines their program to buy night sights for their Stinger missiles. Why do the Marines need Stinger night sights, but the Army does not?

Answer. There is no Army user requirement for a Stinger night sight. It is our understanding that the Marine requirement is for a limited number of units for a special activity.

Question. How do Army Stinger gunners operate at night today?

Answer. There is no specific training for the night environment. If a MANPADS gunner plans to shoot at night he is dependent on his own ability to detect the target.

Question. What is the "probability of kill" currently for a Stinger gunner in a night time engagement?

Answer. The probability of kill would be the same in a night environment as in a day environment since the IR acquisition and IFF capabilities are not influenced by night; however, the system is affected by the probability of detection. The night time effectiveness of Stinger is driven by the gunner's ability to detect the target.

Question. The recent report to Congress by DOD's Director of Operational Test and Evaluation raises concerns about the STINGER-RMP (Reprogrammable Micro Processor). What are the issues and how will you resolve them?

What were the results of previous tests?

Answer. The primary issue concerns STINGER-RMP's ability to destroy ———. It has not demonstrated the performance against this type of target that is desired. This issue was identified and raised during the previous test program. Results of these tests showed that STINGER-RMP can hit fixed wing aircraft in benign and advanced countermeasures environments. The tests also showed STINGER-RMP can hit ———. Resolution of these issues is being pursued through changes to the missile guidance software. Test are planned for summer FY 1989 to demonstrate the effectiveness of these software changes.

We have conducted 55 valid test firings of RMP and RMP Default missiles. As indicated previously, we found that the system can hit fixed wing aircraft in benign and advanced countermeasures environments, that have attained a level of success in engagements of benign helicopters, but have not been as successful with ———.

The Army will conduct sixty STINGER-RMP flight tests in FY 1989 to thoroughly evaluate the RMP software upgrades.

Question. Explain the requirement to develop a Combined Arms Multi-Mission System (CAMMS) missile. Is this a Stinger follow-on?

Provide the funding the CAMMS in each fiscal year from inception through 1994.

Answer. The CAMMS missile, now referred to as TACAWS (The Army Counter-Air Weapon System), will be an air defense missile developed for launch from Army helicopters and Air Defense Artillery Weapons. It is not considered a follow on to the STINGER but will be used for suppression of enemy air defense and self defense. It is required to handle targets at longer ranges, cold targets in clutter and heavily suppressed helicopters.

Tech Base funding for TACAWS is: FY 1992, $5.8 million; FY 1993, $9.7 million; FY 1994, $13.2 million.

MINE WARFARE

Question. Last year we discussed at length the many deficiencies in the Army's fielded mine and countermine capability. The Electronics Industries Association wrote a year ago: "the current methods are crude, such as brave men probing with bayonets, mine dogs, hand held metallic detectors, and awkward mine rollers; none have standoff capability."

Please review the major findings of the last Defense Science Board Study on this topic.

Answer. The major findings on countermine were as follows:

a. Mine detection—no one technique is likely to work by itself in providing good mine detection; thus, the emphasis needs to be of multi-sensor approaches with near real time correlation of the data to provide the mine detection data product.

b. Mine neutralization—the present emphasis in mine neutralization is for a roller system and plow that can be emplaced on the

M1 and M60 tanks. Although these systems can partially meet the requirements, they do not possess the characteristics desired to support rapid maneuver. There are a number of promising explosive mine neutralization techniques that provide a more rapid breaching capability. The high explosive mine neutralization approaches of Shaped Charge Anti-Mine Munition (SCAMM) and Distributed Explosive Charge Array (DECA) provide a requisite overpressure (3,000 psi) to destroy all types of mines by providing overpressure for structural destruction. The utilization of high power microwaves for detonating mine fuzes appears very attractive.

Question. What action is the Army taking to implement these recommendations?

Answer. The Army has provided input to OSD for incorporation in the OSD Countermine master plan which will be sent to Congress. In addition, the overall priority of countermine has increased since 1986 as demonstrated by the increase in funding since FY 1986. Because of technology maturity the FY 1991 program is in excess of 300 percent of FY 1986 Countermine RDTE program. The Training and Doctrine Command and its Combined Arms Center are the Army's combined arms advocates for mine/countermine. Additionally, the Army has revised its manuals on training doctrine, materiel and personnel for countermine warfare. With the revised manuals, increased training emphasis and training simulators, the Army is increasing countermine training and realism.

Question. What progress has been made during the last year?

Answer. During the past year the Army has improved its analytical tools to evaluate countermine effects on AirLand Battle Doctrine by incorporating active countermine play in scenarios for exercises at the National Traning Center. The data collected from this effort will be used to document and validate analytical tools to enhance the understanding and realism of the value/importance of countermine activities in conducting the AirLand Battle Doctrine. The Army has intensified its technology base efforts by incorporating countermine into the Balanced Technology Initiative to ensure that we are working on high payoff efforts in order to maximize our constrained resources. Current Defense Advanced Research Projects Agency (DARPA) efforts are focused on the development of technologies for the rapid-standoff detection of mine fields and individual mines. These efforts will lead to a technology demonstration of aerial/standoff detection capabilities in late FY 1991. In addition, Army laboratories are working on a disposal explosive technology demonstration for FY 1991 which will lead to improved standoff neutralization.

The Army completed fielding of the Mine Clearing Line Charge (MICLIC) to Europe and Korea in FY 1988 and will continue fielding to Forces Command, Army Reserve and National Guard in FY 1989 and 90. The Army will begin fielding Countermine Battalion sets (rollers, plows and Cleared Lane Marking System (CLAMS)) to Europe and Korea in FY 1989 to provide interim breaching capabilities until more promising technologies can be developed and fielded.

Question. What programs does the Army have in Engineering Development as opposed to technology base feasibility studies, to

field a capability to meet the threat?—When will these capabilities actually be fielded to the combat soldier?

Answer. The Army has two programs in Engineering development—Minefield Reconnaissance and Detection System (MIRADOR) and Vehicle Magnetic Signature Duplicator (VEMASID).

MIRADOR is a remotely operated vehicle for detection of surface and buried mines. It integrates four sensors—forward looking infrared radar, narrow band TV, short pulse radar and inductive coil metal detector. Projected fielding date is FY 1998.

VEMASID is an electromagnetic coil that projects a magnetic signature in front of the host vehicle to detonate magnetic influence mines prior to the actual vehicle reaching the mine. VEMASID will be mounted on tanks, artillery and light armored vehicles. Projected fielding date is FY 1993.

ARMY DEVELOPMENT AND EMPLOYMENT AGENCY

Question. The Committee expressed great interest in maintaining and even expanding the role of Army's ADEA organization. Yet the proposed FY 1990 funding of $3.9 million is lower than last year's appropriation of $5 million. FY 1991 is projected to be lower. Dr. Sculley, why is the Army Development and Employment Agency (ADEA) afforded such a low priority by the Army?

Answer. It is really not a question of priorities, the priority of ADEA has not changed. ADEA did undergo a significant reduction in mission during FY88. Effective 1 October 1988 (FY89) ADEA's mission is to establish and maintain the Army Tactical Command and Control System (ATCCS) Experiementation Site (AES). The reduction in mission resulted in a corresponding reduction in funding, compared to previous years, for ADEA to execute the new AES mission. Additionally, due to constrained resources, an across the board tightening of the belt was necessary for FY89. An indepth review of ADEA's FY89 program resulted in a determination that ADEA could execute its FY89 program adequately with $3.9 million instead of the $5.0 million originally approved.

Question. The Appropriations Conference Committee for FY89 requires the Army to submit a report on ADEA by 1 April. Will the report be submitted on time? Can you discuss its major features today?

Answer. OSD is required to submit the report on ADEA, not the Army. The Army has cooperated with OSD, however, at this time, I cannot discuss what the outcome of the report will be.

Question. Please explain why the Army reprogrammed $3.6 million out of FY88 ADEA funds without Congressional approval, in spite of the Committee's special interest in ADEA (as expressed in our report published in June, 1988). How were these funds used?

Answer. The Army is not aware that the FY 1988 ADEA program has been declared a Congressional Special Interest. Because of resource constraints, Army revised the ADEA mission in FY88. In doing so, the old ADEA mission has descoped as I just stated. During the conversion to its new mission, ADEA identified $3.6 million that were no longer required. These funds were returned to DA to be redistributed to other high priority programs.

HYPERVELOCITY MISSILE

Question. The Army and the Air Force have been jointly developing hypervelocity missiles which would kill tanks by propelling a "dumb" warhead at very high speeds. What is the status of the development program?

Answer. The recent Joint Services Hypervelocity Missile Program had two missile configurations—one for the USAF and a larger Army/Marine version. Six missiles of the Army/Marine version were built. Of these, four had been fired when testing concluded in February 1989. The two remaining missiles were transferred to the Army's accelerated Kinetic Energy Missile Program which began in April 1988. The Army plans to replace the Improved TOW Vehicle (ITV) with the Line of Sight Antitank (LOSAT) Weapon System and the desired missile for this system is the Kinetic Energy Missile. The LOSAT program has been structured to accelerate a DARPA prototyping effort begun in early 1988. Originally, this effort was to be only a technical demonstration of the Kinetic Energy Missile on a Bradley chassis with completion in 2QFY90. The effort has now been expanded into a full scale Proof of Principle, and includes all prerequisites for acceleration into a streamlined Full Scale Development that will permit fielding 2-3 years sooner than normal.

Question. There have been problems with the contractor (LTV) in getting the fire control unit to "talk" to the missile. How is this being addressed?

Answer. The primary problems are that the current rocket motor emits too much smoke and the targeting pod used to track/update the missile is inadequate. It should be pointed out that the targeting pod was provided by LTV Corporation at no cost to the Government. This pod was never intended to be a full up fire control system, but only a device to demonstrate missile guidance. Two major efforts are currently under way to insure the fire control system can update the Kinetic Energy Missile. First, LTV Corporation subcontracted Texas Instruments, Inc. to provide a completely new fire control system for the Kinetic Energy Missile Program. This new fire control system will entirely replace the LTV Corporation furnished targeting pod. It will initially be configured with an improved—1½ generation—forward looking infrared (FLIR) sensor, and has been designed for modular replacement as more advanced FLIR sensors becomes available. Second, the composition of the rocket motor propellant is being changed to minimize smoke and the resulting obscuration of the missile. The Army believes that these two efforts will solve the missile tracking/update problems observed during the Joint Services HVM Program.

Question. How much is budgeted in FY 1990 for the hypervelocity missile? How will it be used?

Answer. The AAWS-H Program element for FY 90 has $69.6 million in it; $56.6 million is allocated to LOSAT (Kinetic Energy Missile). The remaining funds are allocated to an Imaging Infrared Seeker Technical Demonstration. The IIR competitive seeker technical demonstration effort is envisioned as a safety net for kinetic energy missile technology. The IIR seeker tech demo will demonstate long range imaging infrared seekers in captive flight. This

will allow a switch in funding priority if hypervelocity technology should fail for technical reasons.

Question. The Committee last year directed the hypervelocity missile program be put in its own, separate funding line. Why has the Army ignored this guidance?

Answer. The Army recently established separate program elements (PE) for LOSAT (Kinetic Energy Missile) and the Advanced Missile System Heavy (AMS-H).

BALLISTIC RESEARCH ON CATS

Question. The members of the Committee are being inundated by letters from around the country protesting the $2 million annual research grant from the Army to Louisiana State University for ballistic head wounds research using cats as subjects. Are you familiar with this issue?

Answer. Yes. The United States Army Medical Research and Development Command (USAMRDC) is funding research by Dr. Michael Carey at Louisiana State University under USAMRDC Contract No. DAMD17-86-C-6098. This contract, not a grant, has a specified statement of work, specific deliverables, and annual funding of $340 thousand per year for a total of $1.7 million over five years.

Question. What is the value of the Army of such research?

Answer. Head wounds are the most lethal battle wounds accounting for approximately half of all combat deaths. Of the patients who survive, fifty percent suffer disabling post traumatic complications (such as seizures) for the remainder of their lives. Although progress in our understanding of brain function and in neurological research has been extensive, the treatment of brain trauma has not been significantly enhanced, and the incidence of combat deaths due to brain wounding has not decreased since World War II.

The reduction of mortality and morbidity requires that studies be conducted which describe the effects of projectile (bullet) injuries to the brain. These studies will lead to a more comprehensive understanding of brain injuries and permit the development of new methods and drugs for the treatment of brain injuries, hastening the recovery of soldiers with brain wounds.

The development of a standardized anesthetized animal model and controlled methods for wounding will allow Dr. Carey to establish a bench mark for quantifying the advantages and disadvantages of new or proposed therapies, drugs, and surgical treatment of brain injury.

Question. How does head wound data on cats translate into head wound data for human beings?

Answer. Cats were selected for use in this study for several important reasons. First, the cat has proportions of grey and white matter similar to that found in the human brain. Brain edema (or swelling) associated with trauma occurs in the white matter, making the cat an ideal model for studies which must translate to human trauma. Baseline data for brain trauma research by civilian investigators has also been developed primarily in cats.

Another factor for selecting the cat is its size in relation to the spherical projectile. The 0.030gm spherical (pin head size) projectile, is the smallest that can be delivered under precisely controlled conditions. Use of this projectile in smaller animals would produce an unrealistic wound and would not provide meaningful information.

Use of the cat represents a compromise between animal size, brain anatomy and size, and projectile size to obtain the best physiological results possible to elucidate similar human brain wounds. The experimental design minimizes the number of animals required and supports future, nonanimal modeling related research.

Question. Why do you think this research is in full compliance with the legal restrictions in annual appropriation acts which prohibit use of DOD funds for research on dogs and cats?

Answer. Secretary of Defense Weinberger implemented an interim policy on the use of animals in ballistic wound research and training on 28 July 1983. That policy was rescinded on 4 January 1984, with the issuance of the Memorandum on the Use of Animals in Training. This Memorandum states that "dogs and cats will not be purchased or otherwise used for the purpose of training Department of Defense students or other personnel in surgical or other medical treatment of wounds produced by any type of weapons." Public Law 100-463, Section 8046, reinterates the language used in Secretary Weinberger's memorandum.

Both the memorandum and the Public Law are directed at the use of companion animals for the sole purpose of training personnel in established methods and techniques. Doctor Carey's research is not directed at, nor does it involve training. It is concerned with developing a thorough understanding of the mechanisms of ballistic injury to the brain and identifying means for improved treatment of humans with traumatic brain injuiries.

The cats are anesthetized prior to injury and are free of pain. The wounded animals receive intensive nursing care during their post-wounding convalescence to minimize pain and suffering. They are housed in warmed cages, given intravenous and topical antibiotics as well as maintenance fluids as needed during their recovery.

Question. Does this grant fully comply with DOD regulations?

Answer. Yes. Dr. Carey's research is in compliance with all DOD regulations, directives and guidelines. In addition, the experimental animal use protocol has been reviewed and approved by the Louisiana State University Animal Care and Use Committee and the Surgeon General's Animal Use Review Office. The Louisiana State University animal facilities are inspected annually by the U.S. Department of Agriculture and the Contracting Officer's Representative, a veterinarian, and are fully accredited by the American Association for Accreditation of Laboratory Animal Care. This accreditation ensures that all animal research adheres to strict standards for preventing or alleviating pain and suffering, that the facility provides a clean, nonstressful, socially-conductive environment, and that adequate veterinary care is provided by a veterinarian certified by the American College of Laboratory Animal Medicine.

Every possible effort is made in this research to obtain the vitally needed answers to alleviate suffering and preserve life following

brain injury in humans by using the best possible animal model available to study these wounds while being sensitive to the well-being of the test animal.

Question. When is this research scheduled to end?

Answer. The contract was initiated in 1986 and is scheduled to expire 29 September 1991.

WWMCCS INFORMATION SYSTEM (WIS)

Question. The World Wide Command and Control System (WWMCCS) Information System is a multi-billion dollar command and control system for all the Services. Air Force has the lead for developing WIS. How does the Army participate?

Answer. The Army WWMCCS Information System (AWIS) program is related to, but not dependent upon, the joint WIS program. The Army's role in WIS is to provide Major Army Commanders and Army-supported Commanders-in-Chief the capability to plan, organize and execute warfighting scenarios encompassing the "Spectrum of Warfare". Through AWIS, the Army develops and fields software and hardware needed to implement the Joint Operations Planning and Execution System and to support Army command and control requirements at Echelons Above Corps. The Army also provides for day-to-day operations and maintenance, system modernization, communications support and management of eight major WWMCCS sites: HQDA, USFORSCOM, USEUCOM, USAREUR, USSOUTHCOM, USWESTCOM, Military Traffic Management Command, and the Army War College.

Question. Press rumors abound that the $2.3 billion WIS program is in serious trouble. What is the status of the development of Army WIS?

Answer. The Army has been an active participant in the Joint program, including the use of Joint developed and fielded products whenever they became available. The Army, however, recognized that there existed an urgent need to proceed independently with development and acquisition of Service-level Command and Control (C2) software and hardware based on a more critical need to field essential functional requirements within the Army. Without the Army effort, any response to the Joint WWMCCS ADP system would be in jeopardy. The Army has collected Command-validated functional requirements, established an architectural baseline, and commenced development of Army standard software applications to satisfy those functional needs. Concurrently, the Army is integrating and installing the necessary C2 hardware platform that will support the Joint and Command-level information requirements.

Question. The Air Force has suggested to OSD that the entire project be transferred to the Defense Communications Agency. Do you concur in this proposal? How would this affect the Army's program?

Answer. The Army concurs with the OSD action to transfer the WWMCCS ADP Modernization Program to the Defense Communications Agency. The Army has always maintained a close working relationship with DCA in an operations and maintenance role and specifically with the DCA Joint Data Systems Support Center (JDSSC) in the fielding of joint operating software. The Army in-

tends to continue that DCA relationship, implementing the maximum use of NDI, COTS, and Service standards to achieve an objective system. In that role, the Army will pursue an incremental, evolutionary "software first" approach, sustain the existing Army WWMCCS ADP sites and support the joint effort as a Lead Military Department (LMD) when appropriately tasked and resourced.

Question. How much is requested in FY 1990 by the Army for AWIS? Provide for the record funding in each fiscal year 1988 to 1994 by appropriation and line item.

Answer. Following is the President's Budget for AWIS:

[In millions of dollars]

	Fiscal year—						
	1988	1989	1990	1991	1992	1993	1994
RDTE	Deleted	Deleted	Deleted	Deleted	Deleted	Deleted	Deleted
OPA	6.4	18.2	31.9	31.9	50.9	51.5	43.6
OMA	20.8	22.8	24.8	29.8	34.9	40.9	40.9

Question. How much AWIS funding is unobligated in the FY 1988 and FY 1989 R&D account?

Answer. $.008 million FY88 RDTE funds and $10.3 million FY 1989 RDTE funds remain to be obligated.

These funds are fully committed and will be completely obligated against ongoing contracts by 3rd quarter FY 1989.

Question. Explain the criteria used to determine in which appropriations development of command control systems are funded. Why are AWIS, AFATDS and FADDC2 in R&D while RCAS (the Army's mobilization C2 system) is in OMA?

Answer. Army funding policy calls for design and development of software in support of strategic and tactical applications to be funded with RDTE.

The Reserve Command Automation System (RCAS) is being acquired in accordance with OMB Circular A–109, which allows industry to propose developmental and acquisition solutions for automation requirements. RCAS will be acquired as a whole system using Other Procurement, Army (OPA) funds beginning in FY 1992. O&M funds are being used to operate the project manager's office for such costs as civilian pay, travel, and contractor support for system documentation including the multifaceted functional description.

LOSSES ON FOREIGN MILITARY SALES

Question. A December, 1988 Army audit states that "improvements were needed in the procedures for recouping nonrecurring research, development, and production costs on sales of major defense equipment ... Implementation of the recommendations in the report could result in one-time collections of about $73.2 million."

Please explain what caused the problems in the audit.

Answer. There are several reasons which caused the problems in the audit.

1. The method used to develop rates for nonrecurring cost assessment requires use of projected quantities and dollars. When these projections are off significantly, then the assessment must be revised. The revised nonrecurring cost (NRC) rates for the item identified in the audit has been recomputed and submitted to Department of Army/Defense Security Assistance Agency for approval.

2. State Department does not provide notification to DOD (Army) of approved export license nor do they coordinate all applications for export licenses with DOD. Therefore, the Army and/or the Major Subordinate Commands (MSCs) are unaware of any monies due the U.S.

Question. General Pihl, what is the Army doing to fix the problems?

Answer. Army Regulation 37-60 is being expanded to include the following procedures.

1. The Army now provides the MSCs with a quarterly listing of all export license applications approved by DOD.

2. The MSCs are required to use this quarterly listing to establish accounts receivable.

3. The MSCs are required to advise the contractors of these DOD approvals and request payment of amounts due the U.S. and follow-up at the end of 30 days.

Question. Foreign Military Sales (FMS) of Army missiles is something we have been doing for a long time. Why are you experiencing fundamental procedural problems at this date?

Answer. Again, several reasons contribute to this situation.

1. Procedures were in place but were not being complied with in all instances by the MSCs. The breakdown was not receiving notification of export license for direct sales from the State Department. The problem was not in FMS.

2. Approximately 50,000 applications for export licenses are processed annually by State of which only approximately 5,000 are processed through DOD channels. Therefore, the Army is unaware of any sale and/or any requirement to collect NRC. Army has requested notification on all cases, but State does not appear to have the resources to do so.

Question. Will the $73.2 million, which when collected into the Treasury directly affects the deficit, be recovered?

Answer. MICOM did not agree with the audit findings amounting to $73.2 million as being an accurate figure. However, contractors have been billed for monies due on the 19 cases identified in the audit. Payment is expected within the next 60-90 days. A more reasonable estimate for collection is approximately $28.1 million.

Question. For the record, provide the status of each issue recommendation in Army audit SO 89-200.

Answer. All action has been taken by the commands as indicated in command response to the audit findings and recommendations, as follows:

RECOMMENDATIONS AND COMMAND COMMENTS

For the Program Executive Officer, Air Defense

A-1. Recompute the nonrecurring cost recoupment rates for major defense equipment in the Patriot missile system. Ensure that the most current cost and production data available are used in the recomputations. If the recomputations identify changes exceeding the thresholds in the July 1987 guidance, request Defense Security Assistance Agency approval to change the rates.

The program executive office agreed with the recommendation and stated that the nonrecurring cost recoupment rates for the Patriot missile system have been recomputed and were submitted through command channels to the Defense Security Assistance Agency for approval on 10 February 1988. Also, future annual reviews will be conducted and documented.

The program executive office did not agree with the parts of the finding involving the Patriot missile system, and stated that reviews of the Patriot rates were made in 1985 and 1986. The reviews were documented and included correct cost and production data. Also, the 1987 review was made as a result of the annual tasking from the Missile Command's Resource Management Directorate and not as a result of the audit.

The program executive office also did not agree with the potential monetary benefits that would result from implementing the recommendation. The office stated that the additional $38.4 million for the six major defense equipment items included in the audit would be offset by price changes for other items that were not part of the recommendation. The office recomputed rates for seven nonmajor items that are part of the Patriot system. The office stated that the revised rates for the nonmajor items would result in a decrease in recoupments of about $51.4 million, eliminating the potential increase for major items. The office further stated that DOD Directive 2140.2 and AR 37-60 appear to permit rate reductions for nonmajor items and, therefore, those rates should be revised.

U. S. Army Audit Agency Evaluation. The office had no support for its statement that rates were reviewed in 1985 and 1986. At the Missile Command, replies to the Resource Management Directorate's requests for 1985 and 1986 reviews included statements that recomputations were not necessary because there had been no significant changes in cost and production data. Between March

1985 and November 1986, however, the total nonrecurring cost of research, development and production for the Patriot System increased by about $88 million. Also, projected production quantities for U. S. Armed Forces increased by 60 systems. Patriot personnel had no documentation to validate that these large increases did not significantly affect any of the Patriot recoupment rates. Because no documentation was maintained to support the annual reviews, there was no assurance that the reviews were made or, if made, were accurate. Also, the 1987 review performed by command was not made until after we submitted a draft of this finding. Since command had not documented the two previous reviews, we believe that our finding, and not the tasking from the Missile Command's Resource Management Directorate, prompted the rate recomputations.

DOD Directive 2140.2 and AR 37-60 prescribe that, once established, recoupment rates for nonmajor defense equipment normally should not be revised unless the equipment is subsequently reclassified as major defense equipment. Also, DOD Manual 7290.3M clearly states that recoupment rates for nonmajor defense equipment should not be revised unless (i) the equipment subsequently qualifies as major defense equipment or (ii) the defense supply system price for the equipment increases so that computation of a new rate would result in an increase of at least 30 percent over the approved rate. None of the seven items of Patriot nonmajor defense equipment qualified as major defense equipment. Further, the defense supply system price for six of the seven nonmajor items did not increase, but instead decreased. The remaining nonmajor item was a new item added to the Patriot system and, accordingly, command's request to establish a rate for this item was proper. The addition of this item should increase recoupments by about $41,000. Moreover, the proponent of DOD Manual 7290.3M stated that the guidance in the manual was clear and that the Missile Command's request to change the rates for the six Patriot nonmajor items was not appropriate. Accordingly, the $38.4 million identified in the finding should not be offset by proposed rate reductions on nonmajor items. The $38.4 million identified in the finding should not be offset by proposed rate reductions on nonmajor items. The $38.4 million remains a reasonable estimate of the potential benefits from implementing the recommendation.

A-2 Recompute the nonrecurring cost recoupment rates for different models of the Stinger and Chaparral missile systems. Ensure that all current cost and production data available are used in the recomputations. If cost records are not available to

recompute the rates for the various models of the Chaparral missiles, request approval from the Office of the Director of Finance and Accounting, Office of the Assistant Secretary of the Army (Financial Management) to establish a unit charge equal to 4 percent of the contract price. For rates that need changing, request Defense Security Assistance Agency approval to make the changes. Also, make annual documented reviews of the rates for all weapon systems managed.

The program executive office agreed with the recommendation and stated that new nonrecurring cost recoupment rates for the different models of the Stinger and Chaparral missile systems were developed in May 1988 using current data and submitted for approval to the Defense Security Assistance Agency. Since cost records are not available for the Agency. Since cost records are not available for the Chaparral missiles., a request to charge 4 percent of the contract price for the missiles was sent through the appropriate channels to the Office of the Director of Finance and Accounting, Office of the Assistant Secretary of the Army (Financial Management) for approval in May 1988. Also annual reviews of nonrecurring cost recoupment rates for all systems will be made and documented.

For the Program Executive Officer, Fire Support

A-3 Recompute the nonrecurring cost recoupment rates for the different models of the Tow missile system. Follow guidance in the July 1987 revision to DOD Directive 2140.2. If the rates need changing, request Defense Security Assistance Agency approval to make the changes. Also, make annual documented reviews of the rates for all weapon systems managed.

The program executive office agreed with the recommendation and stated that the nonrecurring cost recoupment rates for the different models of the Tow missile system have been recomputed in accordance with the July 1987 revision to DOD Directive 2140.2. Revised rates have been submitted to the Defense Security Assistance Agency for approval. These actions were completed on 7 March 1988. Also, future annual reviews of the rates will be made and documented.

RECOMMENDATIONS AND COMMAND COMMENTS

B-1 Recoup the $11.4 million of government costs from the defense contractors for the 19 direct sales identified during the audit.

Command agreed and stated that actions would be taken to recoup the nonrecurring costs on the 19 sales cases with evidence of State Department approval. In February 1988, actions were initiated through the Security Affairs Command to obtain evidence of State Department approval for the 19 direct sales identified during the audit. Command estimated that corrective actions would be completed within 30 days after State Departmental approval is verified.

B-2 Review the file of export license applications and contact the State Department through command channels to identify any sales that have been made or that have been approved and will be made. Recoup applicable costs for all sales already made and request contractor payment schedules for all pending sales.

Command agreed and stated that in February 1988 actions were initiated through the Security Affairs Command to ascertain the status of all export license applications older than 60 days. When evidence of State Department approval is received, outstanding nonrecurring costs will be recouped. Command estimated that corrective actions would be completed within 30 days after State Department approval is received.

B-3 Take action on all future export license applications received to ensure that:

- Potential recoupments are identified in the Defense Security Assistance Agency report to higher command levels.
- Followup actions, to determine whether export licenses have approved by the State Department when required, are initiated through the Security Affairs Command.
- Payment schedules are requested following notification of the State Department's approval of export license applications.

Command agreed and stated that required procedures for recouping costs would be followed for all future export license applications received. Actions to be taken include reporting potential recoupments to higher command levels, following up on pending

export licenses, and requesting payment schedules when notification of Statement Department approval is received.

B-4 Establish procedures to periodically contact government representatives at the facilities of the largest contractors for missile items to identify direct sales and ensure recoupment of government costs.

Command did not agree and stated that it is not the Missile Command's responsibility to contact government representatives at contractor facilities to identify direct sales that may have occurred, nor is such a representative a valid source of State Department approval.

RECOMMENDATIONS AND COMMAND COMMENTS

For the Commander, U. S. Army Materiel Command

C-1 Change the Commodity Command Standard System to ensure that surcharges for transportation costs are included in automated bills to foreign customers.

Command agreed and stated that it had prepared a systems change request for the Automated Logistics Management Support Activity, which is the manager of the Commodity Command Standard System, to add transportation surcharges on automated billings. Also, the standard operating procedures for the system will be revised to include the details of the system change. All corrective actions should be completed by 30 November 1988.

For the Commander, U. S. Army Missile Command

C-2 Provide training to accounting personnel involved in preparing foreign military sales bills and make sure supervisors review bills for correctness before they are sent to the Security Assistance Accounting Center.

Command generally agreed and stated that courses offered by the Defense Institute of Security Assistance Management have been requested for accounting employees. Also, all new technicians have taken the automated fundamentals of billing course. Locally developed training will continue to be provided to the employees. Command also stated that since January 1988 team leaders have been responsible for routinely validating the authenticity of bills and supervisors have been periodically performing spot checks to ensure that the process is working.

C-3 Correct previously prepared bills for the errors identified during the audit. Also, ensure that case closet reviews are sufficiently comprehensive to identify and correct the types of billing errors identified.

Command agreed and stated that billing adjustments were made as of 31 May 1988 for those items in error. Command also stated that case closeout procedures have been examined to find cost-effective ways of improving them. Command did not agree that the reported potential monetary benefits of $6.7 million were reasonable. Command stated that the $6.7 million was estimated using projections that were based in part on errors made by command in estimating billings. Under direct cite financing (the type of

financing used for the cases reviewed by the auditors), a bill prepared when items are delivered to the customer has no effect on United States cash balances contained in Federal Reserve banks. Also, since most items are shipped before the final cost is known, delivery bills must be estimated. Estimates are subject to change many times before actual costs are known. To reverse estimated billings before actual costs are known would not be worthwhile. Moreover, since it is a very labor intense process, it should only be done when there is a valid reason. Command also stated that three of the bills in our sample were actually correct, but were recorded as incorrect by the auditors. Accordingly, the error rate and the monetary benefits should be reduced. Command provided the following comments concerning the three bills:

- Case NE-VQI was not overbilled $31,448 when items were billed at the replacement price although the items were not to be replaced.1/ When the case was initiated, plans were to replace the items and the bill was prepared accordingly. Since the bill had already been processed in accordance with AR 37-60, a subsequent decision to not replace the items does not require an adjustment to the bill. DA pricing personnel agreed with the Missile Command's interpretation and stated that the bill was properly processed. Had the decision not to replace the items been made prior to delivery, the case would have been amended and billed accordingly. A subsequent decision not to replace the items should have no effect on the billed price.

- Case NE-VNW should not be considered to have been underbilled $193,853. It is possible that the bills were not based on exact commitment values due to the complexity of this task.2/ These bills will be corrected after all items are shipped and final costs are identified. Estimated bills should not be considered erroneous bills.

- Case SR-VAP was not overbilled $20. The bill was based on the actual commitment value from the Standard Army Procurement Appropriation System at the time the bill was prepared.

C-4 Revise local procedures to require that program managers (i) received and review the quarterly lists of items shipped but not billed and (ii) ensure that the bills are prepared for the items shipped but not billed.

Command agreed and stated that, by 30 November 1988, program managers in its Security Assistance Management Directorate will be furnished copies of the quarterly lists of items shipped but not billed for their information and action. Command, however, did not agree that $135,000 was a reasonable estimate of the potential monetary benefits and stated that the $135,000 interest referred to in the report is based on delivery billings not being submitted to the trust fund until case closure. It is illogical to assume that delivery billings will not be processed until case closure. It is command's policy to process delivery billings as soon as possible after delivery using the best dollar value estimate at that time and to adjust to actual costs prior to case closure. In fact, estimated delivery billings were completed for the items in question during February 1988. Usually, billing adjustments to actual costs are relatively small. Therefore, the projected cost avoidance is grossly overstated.

1/ A bill for an item can be based on one of two amounts. If the U. S. Government will have to replace the item which is sold to a foreign country, then the bill should be based on the cost to replace the item (replacement price). If the government will not replace the item, then the bill should be based on the cost the government paid for the item (standard price).

2/ Estimated bill's are based on the amount of funds that the government has reserved to be spent for an item. This reserved amount of funds is referred to as the commitment value.

RECOMMENDATIONS AND COMMAND COMMENTS

D-1 Use cost curves to develop payment schedules for foreign military sales cases. Either use the cost curves in AR 37-60 or, if the curves in the regulation are not appropriate, develop cost curves based on historical cost data.

Command agreed and stated that, as part of the ongoing Security Assistance Automation Army effort, a standard payment schedule program based on use of AR 37-60 cost curves has been developed and will be used by the Missile Command in lieu of the current straight-line method of computing payment schedules. It is anticipated that the program will become operational by December 1988.

D-2 Direct supervisors to make sure that foreign military sales cases that extend for 2 years or more are reviewed annually by program managers to determine whether payment schedules are correct. Revise payment schedules when differences of $500,000 or more or at least 10 percent occur between costs shown in payment schedules and expected costs.

Command agreed and stated that procedures were established on 2 March 1988 which provide for program managers to review payment schedules annually. The schedules will be revised when difference of $500,000 or at least 10 percent occur between costs shown in the payment schedules and costs expected to be incurred.

D-3 Provide program managers with training in case management. Command agreed and stated that training in case management will be provided for those program managers lacking the necessary security assistance experience and knowledge. Each supervisor in the Security Assistance Management Directorate has been tasked to assess his or her program managers' needs for the training and add it to the individual development plans of those requiring it. The plans will be revised by March 1989 to include any needed training in case management. Employees with the recommended training on their plans have been and will continue to be allowed to attend the formal courses.

TEST RANGES

Question. The Army's budget shows significant funding growth for its test ranges. Funding in the test ranges line jumps from $191 million last year to $227 million, about 20 percent. Test instrumentation and threat simulators funding (in another line) increases about 50 percent to $67 million, while the instrumentation and target line increases 15 percent to $69 million.

Answer. In response to your initial statement, the test ranges line is the operating expense for our major test facilities and other technical test and evaluation activities which are subject to increases in test workload. The instrumentation, targets and threat simulator lines are investment projects which would be level of effort funded if, during the past five years, a reasonable level of funding had been established. This was not the case; therefore, we are seeking new levels which permit selective improvement for efficient and less costly testing of modern, high technology systems. We are also seeking to perform realistic live fire and operational tests at your repeated direction. The justifiable and severe criticisms of Congress and your auditing agencies have also been reacted to by the Office of the Secretary of Defense which has increased their established investment lines (PE 0604340D and PE 0604940D). Detailed coordination with the Services was accomplished to assure the more important capital improvements were funded without duplication between ours and their investment or capital improvements.

Question. What are the requirements driving the significant growth in your proposed funding for test ranges?

Answer. The growth in test range operating accounts is because of increased workloads, military to civilian conversions, replacement of obsolete range equipment and government and contractor wage increases. For example:

1. At the urging of Senator Domenici and others, the Secretary of Defense directed an increase in funds ($9 million) for operating the high power laser at the High Energy Laser Systems Test Facility.

2. Increase of $7.6 million required due to conversion of military to civilian contractor for maintenance of aircraft. Transfer was from within Army resources.

3. The approved civilian pay raise and increases in contractor wages, accommodated within this program element which pays the salaries for the work force, result in range support costs increasing by $7.5 million.

4. Replacement of inefficient and worn-out obsolete equipment; e.g. temperature conditioning units, noise monitors, cables, automotive test equipment and courses, meteorological monitors, firing barricades, range patrol boats, air delivery support equipment, etc., is necessary to maintain cost effective ranges. Such equipment is not the kind of major instrumentation or capital investments purchased in other accounts. These costs account for the remaining $12 million growth in range operating costs.

Question. What specific capital investments are envisioned and why?

Answer. Our capital investment program for the Army test community is so far behind that major increases are required to test

modern systems realistically, effectively and economically. Our Army test investment programs are inadequate requiring supplementation by OSD investment programs to meet the demands of fielding suitable weapons systems and equipment. As such, ours and OSD's programs have been carefully integrated to meet all Services, Congress, GAO, HAC S&I, and others requirements for quality testing. A few specifics follow to support the growth in these accounts:

1. Technical Test Instrumentation and Targets (P.E. 0605602A): This program consists of some stand alone items and some that are part of a grouping or suite of instrumentation. Airspace surveillance radars (1950 vintage) for range safety at WSMR are being replaced. A robotic mannequin capability with associated instrumentation will be acquired for live fire tests. The stress loading facility capability to test C3I systems in realistic electromagnetic (friendly and enemy) environments will be increased. We have no capability to test the end game of smart munitions; with OSD integrated support we are developing a suite of instrumentation that can be moved to wherever any Service needs technical or operational test support. Controlling helicopter targets at low altitudes performing "jinking and juking" manuevers will be developed to improve existing drone control systems. Electronic warfare jamming equipment will be developed and integrated into other suites of instrumentation. Design efforts will continue on integrating Army tactical space systems testing needs with the Air Force space test range. With respect to aerial targets development, the Army will continue on development efforts for rotary and fixed wing targets (MIG–27, HOKUM and HAVOC) and subscale targets that will be used for both training and testing. These targets will support development and operational tests of both aviation and air defense systems adding realism that is only partially attained through droning Army and Air Force obsolescent aircraft.

2. User Test Instrumentation and Threat Simulators (P.E. 0605603A). Congressional mandates for realistic operational tests have resulted in increases to this program. Our investment strategy continues to be based on developing and acquiring suites of instrumentation, targets and threat simulators to test modern systems. The centerpiece is the Mobile Automated Field Instrumentation System (MAFIS) which will be used in testing armor, air defense, aviation and other systems in force-on-force scenarios, requiring continuous information on what each system under test and each threat item is doing while engaged in battle formations. Related instrumentation systems to accomplish pairing through obscuration, intelligence and electronic warfare operations and video data reduction will be acquired. The threat simulator project funding will result in the fielding of threat helicopter, command and control and air defense systems for more realistic tests of FAADS and LHX systems. The project is coordinated with the OSD program, as directed by Congress. Such direction in FY 1989 resulted in a $20 million transfer of funds which, had they remained in the Army program, would have meant the increase to the program element to be less than seven percent (not the 50% cited above).

Question. A January, 1989, DOD Inspector General report on the acquisition and management of equipment at DOD ranges cited

"several internal control problems relating to the accountability of equipment and the identification of idle and excess equipment. In addition, the test ranges were not realizing the benefits from establishing and effectively managing equipment pools."

How does this relate to Army test ranges?

What specific management initiatives are under way or planned by the Army?

Answer. The Army range cited in the January, 1989 DOD Inspector General report was the Combat Systems Test Activity, Aberdeen, Maryland. The management initiatives we took were:

a. Test Centers have been directed to consolidate property books in order that total visibility of on hand assets will be known. Equipment managers have been directed to review for idle/excess equipment prior to local purchase.

b. Equipment managers have been directed to screen all on hand assets for requirements (regulatory guidance) prior to accomplishing local purchase of like items.

c. Action has been initiated to upgrade the Test Centers' computer program, Installation Equipment Management System, which will make assets visible to other Test Centers prior to procuring like items.

Question. Explain how the Army Shares its test ranges with other Services, and how Army policies promote use of the ranges of other Services by Army testers.

Answer. The unique capabilities of our ranges results in their frequent use by the other Services, SDIO, NASA and DOT. The extensive instrumentation, drone control and other capabilities have resulted in cruise and other missile tests at WSMR. About 10% of WSMR annual workload is for the other Services. Yuma Proving Ground continues to support Air Force GPS tests. Dugway Proving Ground supports other Services' chemical war fare and biological defense tests. Likewise, the Army tests missles at the Air Force Eastern Space and Missile Center, conducts EMP tests at the Air Force Special Weapons Center, sled tests at Kirtland AFB and environmental chamber tests at Eglin AFB. If the Army project manager can show that he can get the tests he needs at the costs he can afford, our policy permits him to use other DOD test facilities. Since test planning for all major systems is approved at OSD level, the enforcement management mechanism is in place to assure mandatory consideration of each Services' test capabilities.

JOINT STARS

Question. For the record, explain the tethered aerostat initiative in the JSTARS program in detail and its total R&D/Procurement cost.

Answer. ———. The DEPSECDEF directed that the SASS program support CINC SOUTHCOM. FY 1990 procurement funds will be utilized to purchase the existing sea-based system. RDT&E funding for FY 1990–1991 will support the development of the militarized land-based version of the SASS mooring system.

Total RDT&E and Procurement funding to support the SASS program is $24.4 million.

LIGHTER AMPHIBIAN HEAVY LIFT (LAMP-H) VEHICLE

Question. The Army proposes a new start program to develop the LAMP-H vehicle and requests $15.3 million in FY 1990 for engineering development. What does LAMP-H do? What is the requirement for such a vehicle?

Answer. The LAMP-H Heavy Lift Amphibian is the only craft capable of transporting cargo in excess of 25-30 short tons (e.g., the M-1 Abrams Tank and the Bradley Fighting Vehicle) across the beach for offloading in those areas of the world where commercial ocean ports are inadequate, unavailable or denied. The LAMP-H air cushion vehicle is capable of transversing 90 percent of the tactical beaches worldwide as compared to less than 25 percent for conventional displacement landing craft such as Landing Craft, Utility (LCU).

Question. What does the Army use today?

Answer. The current Logistics Over-The-Shore (LOTS) watercraft inventory is composed of conventional displacement watercraft, such as the Landing Craft, Utility (LCU) and the Landing Craft, Mechanized (LCM); the Lighter Amphibious Resupply Cargo, 60 Ton (LARC-LX); and the Lighter Air Cushion Vehicle, 30 Ton (LACV-30). Where prohibited by shallow gradients and poor bottom conditions (e.g., Southwest Asia (SWA)), the displacement watercraft cannot offload cargo over the shore without installation of massive beach interface systems (3,000-5,000 foot floating or elevated causeways) or extensive dredging of the beach approach prior to offloading arriving strategic sealift.

The LARC-LX is a slow, wheeled Amphibian over 30 years old. An M-1 Tank cannot be offloaded in-stream onto a LARC-LX. A wheeled Amphibian such as the LARC-LX is not mission capable in SWA because of the poor bottom conditions there (mud, silt, and coral). The LACV-30 payload is limited to 25-30 short tons and the craft cannot transport either a M-1 Tank or Bradley Fighting Vehicle.

Question. Why is this an Army Responsibility?

Answer. DoD Directive 5100 and U.S. Code Title 10, subtitle 3062 mandate that the Army provide organic water transport in support of deployed forces. It is the Army's mission to operate common user ports in a theater of operations, including the conduct of LOTS operations. Inherent in this mission is the handling of Air Force, Navy and Marine Corps cargo, as well as Army cargo. An Army/Navy Memorandum of Agreement tasks both services to meet Department of Defense programmed force requirements for Southwest Asia (e.g., Army discharge capability, to include LAMP-H, is sized to meet Navy Strategic Sealift delivery capability).

Question. What is it urgent now?

Answer. The LAMP-H program is not a sudden decision nor a new start. An internal Army Letter of Agreement (LOA) was signed May 1982 for an air cushion lighter for transporting heavy equipment, LOTS support equipment, the M-1 tank, tracked and wheeled vehicles, 20/40 foot containers, and general cargo. The Operational and Organizational Plan was approved in August 1988. The LAMP-H is currently transitioning from advanced development to engineering development.

Question. What is the total development cost?

Answer. The total development cost for the LAMP-H is estimated at $31.5 million.

Question. How many are needed and at what total procurement cost?

Answer. The Army plans to buy 28 LAMP-H crafts at an estimated procurement cost of $338 million.

Question. What are the proposed performance characteristics and specifications for the vehicles?

Answer. The LAMP-H will be a self-propelled air-cushion amphibious craft capable of:

Fully loaded minimum over-water speed of 10–15 knots.

Operating at full payload in conditions up to and including sea state 2.

Operate at full payload with a reduced speed of 8–12 knots in sea state 3.

Negotiate a 5 foot high plunging surf.

Clear ground obstacles to three feet vertical height.

Capable of transporting one combat-loaded M1A1 tank, two 40-foot containers or 100 short tons of cargo or 2 M1A1 fully loaded tanks in overload condition.

Operate with a full cargo payload without refueling for a minimum of 5–10 hours.

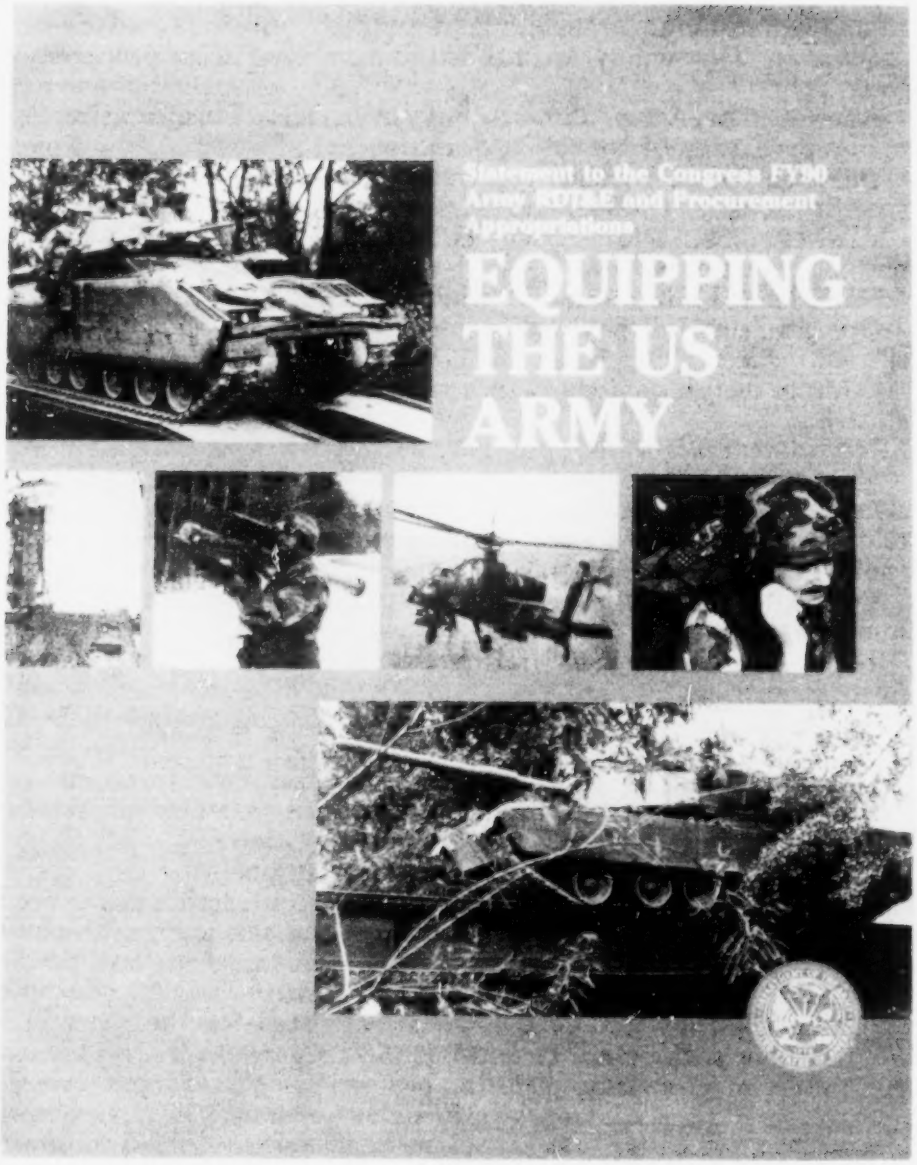
It will weigh less than 67.5 short tons so it can be lifted by auxiliary crane ships.

The LAMP-H will be transportable on LASH and SEE-BEE ships.

Question. What is your acquisition strategy? Is there competition? How concurrent is the program? Will you obtain prototype vehicles for testing prior to a production decision?

Answer. A single contract for full scale engineering development and production will be awarded. At least 3 contractors are expected to bid for the work. One prototype will be fabricated for testing prior to production. The technology needed to design and produce the LAMP-H is well within the current state-of-the-art.

[CLERK'S NOTE.—End of questions submitted for the record. The Joint Statement of Dr. J.R. Sculley and Lieutenant General Donald S. Pihl as referred to on page 18, follows:]


Statement to the Congress FY90
Army RDTE and Procurement
Appropriations
EQUIPPING
THE US
ARMY

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, DC 20310-0103

February 28, 1989

Members of Congress:

To win on any battlefield across the spectrum of conflict we need quality soldiers who are well trained, well led, and well equipped. With the support of Congress, the Army has made that winning combination a reality in the 1980's. Our warfighting capability has improved steadily, with an improved equipment posture contributing significantly to that goal. Our ground forces are becoming a well earned and meaningful symbol of our nation's resolve to maintain an adequate deterrence to war.

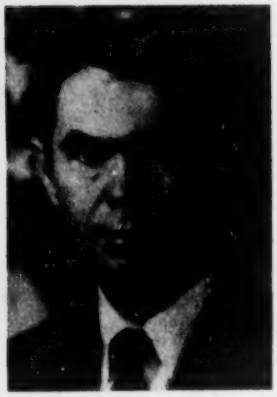
Maintaining our momentum in Research, Development and Acquisition, in a time of fiscal constraints, is a challenge that requires vigilant and innovative RDA management. We continue to streamline the acquisition management process in accordance with Presidential and Congressional mandate. Our reorganization has resulted in a shortened and direct reporting chain allowing for better, more concentrated management. Cost effectiveness is a concern at every stage of the RDA process. The maximum use of competition, multi-year procurement, and other cost saving methods are critical. To provide further cost discipline, within an operationally meaningful framework, we are developing a cohesive set of mission area modernization plans. The recently completed Army Aviation Modernization Plan will serve as a model for plans to follow. With adequate economic stability, we can plan more effectively for the near, mid and long term; however, undue turbulence in the levels of funding complicates efforts to insert rational cost control into the RDA process.

In our enclosed statement we try to provide a context for individual program requests. Following the introduction, which provides an overview of RDA objectives, weapon system programs are covered under AirLand Battle Doctrine categories so that strengths and weaknesses can be measured against operational needs. In addition to this statement, we are making available to you the 1989 Army Weapons Systems Handbook, a consolidated reference for a number of our weapons systems.

It is an honor to represent the Army before the first session of the 101st Congress. We trust our testimony contributes to your deliberations.

Donald S. Pihl
Lieutenant General, GS
Military Deputy to the
Assistant Secretary of the
Army (Research, Development
and Acquisition)

J. R. Sculley
Assistant Secretary of the Army
(Research, Development and Acquisition)



Honorable Jay R. Sculley

Assistant Secretary of the Army for Research, Development and Acquisition

Dr. Jay R. Sculley, the Assistant Secretary of the Army for Research, Development and Acquisition, took office on October 13, 1981.

As Assistant Secretary of the Army for Research, Development and Acquisition, Dr. Sculley is the Scientific Advisor to the Secretary of the Army and is responsible for Army-wide policy development and oversight of research, development, test and evaluation programs for materiel acquisition management, policies and procedures. He is also responsible for implementation of worldwide security assistance policies and international programs.

Dr. Sculley is a graduate of the Virginia Military Institute where he received a Bachelor of Science degree in Civil Engineering in 1962. Following graduation from VMI, he served as an officer in the U.S. Air Force and later was a design engineer with the Dupont Company before earning his MSE and Ph.d. at the Johns Hopkins University.

In 1970, Dr. Sculley joined the VMI faculty and served four years as an assistant professor of civil engineering before electing in 1974 to leave teaching and enter industry. He was General Manager of Corrugated Services, Inc., a Texas paper recycling company, for one year before returning to VMI in 1975.

During his faculty years at VMI, he was actively involved in engineering research through the VMI Research Laboratories, Inc. He is the author of numerous papers and has been elected to Who's Who in Engineering. At the time of his appointment by President Reagan, he was Professor and Head of Civil Engineering, VMI's largest academic department.

Since assuming his present position, Dr. Sculley has been instrumental in improving the management and cost discipline of major hardware acquisition programs. He directed the integration of technology base efforts throughout the Army and expanded the program for centers of excellence at American universities for Army sponsored research. He has also initiated programs to upgrade the training, development and utilization of people throughout the research, development and acquisition field.

Dr. Sculley is married to the former Peggy Lee Winkel of Baltimore. They have a daughter, Rebecca Lee and a son, Mathew Jay.

Lieutenant General Donald S. Pihl

Military Deputy to the
Assistant Secretary of the Army
(Research, Development and Acquisition)

Lieutenant General Don Pihl was born in San Francisco, California, on 18 August 1937. He was commissioned a second lieutenant in Armor through the Reserve Officer Training Corps Program upon graduation from the University of California at Berkeley in 1959. He earned a Bachelor of Science degree in Business Administration and later a Masters in Business Administration. His military schooling includes the Armor Officer Basic Course at Fort Knox, Kentucky, the Quartermaster Career Course at Ft Lee, Virginia, the Armed Forces Staff College at Norfolk, Virginia and the Army War College at Carlisle Barracks, Pennsylvania.

General Pihl held various troop and squadron positions with the 25th Infantry Division, United States Army, Pacific, after which he was assigned to Korea and commanded a company in Eight Army. On returning to the United States, he was assigned to the Combat Developments Experimentation Command at Fort Ord, California, as a Contracting Officer. General Pihl served as the Aide-de-Camp to the Commanding General, United States Army Test and Evaluation Command, Aberdeen Proving Ground, Maryland. General Pihl was assigned as S1 (Personnel) in the 16th Armor Group at Fort Knox, Kentucky. This was followed by a tour as Executive Officer, 4th Battalion, 37th Armor at Fort Knox, Kentucky. He was assigned as Executive Officer, 1st Battalion, 77th Armor at Fort Carson, Colorado and for a year with the same unit in Vietnam. General Pihl was assigned as an Operations Research Analyst in the Office of the Assistant Vice Chief of Staff, Department of the Army, Washington, D.C. He was the Military Assistant to Secretaries of the Army Resor and Froehlke. General Pihl commanded the 3d Squadron, 11th Armored Cavalry Regiment, United States Army, Europe. He was assigned to the Training and Doctrine Command, Division Restructuring Study Group and later as the Chairman of the Combat Developments Planning Group at Fort Monroe, Virginia. General Pihl commanded the 3d Brigade, 3d Armored Division (Spearhead) at Friedberg, West Germany. Remaining in Europe, he served as the Chief of Staff, 3d Armored Division (Spearhead) in Frankfurt. General Pihl became the Deputy Director of Weapons Systems, and later was reassigned as Director of Combat Support Systems in the Office of the Deputy Chief of Staff for Research, Development and Acquisition, Headquarters, Department of the Army, Washington, D.C. Prior to assuming his present position, General Pihl was the Commanding General of the 9th Infantry Division (Motorized), Fort Lewis, Washington.

General Pihl's decorations include the Distinguished Service Medal, the Legion of Merit (with Oak Leaf Cluster), the Bronze Star Medal for valor (with Oak Leaf Cluster), the Purple Heart, the Meritorious Service Medal, the Army Commendation Medal (with two Oak Leaf Clusters), and the Combat Infantryman Badge.

He is married to the former Sandra Young. They have two sons, Douglas and Gregory, and one daughter, Victoria.

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INTRODUCTION

It is a pleasure to appear before this committee once again to describe how the Army proposes to equip and arm itself. Today, we are presenting you with an FY90 research, development and acquisition budget request for $20.5 billion. This request represents our best effort to provide a balanced program to maintain near term readiness, continue momentum in our modernization programs, and to focus on research and development efforts that promise the greatest potential for improving our warfighting capability.

The Army has made steady progress in its equipment posture in the 1980's, and our overriding concern is to maintain that progress as we look forward to the challenges of the 1990's. The need to keep our conventional forces strong has been further amplified by the recent signing of the Intermediate Nuclear Forces (INF) Treaty. Although the INF Treaty is a welcomed action, it poses an additional challenge to the Army to enhance its conventional capabilities.

The qualitative leverage we possess in some equipment areas must offset Warsaw Pact quantitative superiority and steady Soviet technological advances. Fortunately, we are able to build on the achievements of the 1980's, as the following summary will indicate.

Return on 1980's Investment

Our procurement priority in this decade has been to produce and field a host of major items which had successfully completed R&D at the beginning of the 1980's. It would have been a national tragedy had we not been able to draw on this investment and equip our soldiers with the full range of these systems. With the support of Congress we have been able to do just that. We have established the momentum and the RDA strategy we want to continue to pursue: that is, produce new systems that have significant growth potential; product improve them to correspond to new threats and technological breakthroughs; buy Nondevelopmental Items commercially where that makes sense; and selectively invest in bringing high leverage new starts from R&D to production. Our overall acquisition strategy has been to buy equipment in a synchronized way across all mission areas.

Following this approach in the 1980's, the Army has fielded meaningful quantities of the best tank and fighting vehicles in the world (66 Abrams tank battalions and 33 battalions of Bradley Fighting Vehicles). We now have two unparalleled helicopters deployed, one devastating against armor (11 attack battalions of Apache), and the other a key asset to improved mobility and logistics, the Black Hawk Utility helicopter (over 1000 now produced). PATRIOT, the most sophisticated and effective air defense missile system ever built, is now operational in nine battalions. We have given the artillery its first rocket launcher capability in 30 years (24 batteries of MLRS fielded worldwide). Copperhead, which represents the beginning of smart munitions and an artillery capability for pinpoint destruction of high value targets, has now completed procurement (over 24,000 produced or on-contract). These are just a few of the major items that have come through the production pipeline to increase our combat power.

At the same time we have product improved a host of items to stretch their capabilities to the maximum (e.g., Chaparral, Hawk and TOW missiles, AH-1S Cobra and CH-47D helicopters, M109 howitzers, Stinger missile and many other items).

Our RDA investment efforts of the 1980s have resulted in an Army better equipped to combat the threat across the entire spectrum of conflict, however, the Soviets have also made steady improvements. A brief assessment of some Soviet equipment trends follows.

The Threat

For years, the West has relied upon its technological prowess to manage the military threat posed by numerically superior forces of the Warsaw Pact. Since the late 1970's, however, the Pact's quantitative advantage has been complemented by qualitative force enhancements.

Research and development by the Soviets is paying off with technological advances which rival, and possibly even surpass our own. This is particularly true for ground force weapons systems where R&D accounts for a significantly greater share of defense resources in the Soviet Union than it does in the US. Examples of high-technology ground force equipment currently include a new tank, a new tactical air defense gun system, new tactical advanced helicopter gunships like the HAVOC and HOKUM, and dual-capable (conventional and nuclear), self-propelled artillery.

While the current direction of internal Soviet political debate over the allocation of defense resources is likely to result in lower military procurement levels in the next 2-5 years, perhaps sooner, there is no historical precedent nor evidence to suggest defense R&D in the USSR will suffer. The use of space-based systems to enhance ground combat capabilities will also provide better warning, command and control, and synchronization of ground force actions.

Difficult as the Soviet challenge may be, however, the Army cannot concentrate exclusively on the Soviet threat. Every reasonable forecast envisions continued instability and conflict in the Third World. Opposition forces will have at least a few weapons systems comparable to or better than our own. In some cases, they already possess a full range of modern, sophisticated weapons which are available from the world arms markets or from sponsors such as the Soviet Union.

The Chemical/Biological Warfare threat is worldwide, growing and changing in character. The Soviet Union continues to take advantage of emerging technologies in the fields of biotechnology and genetic engineering to develop new agents. These new agents result in the potential for technological surprise that poses unique challenges to our defensive capabilities. As with the conventional threat, we cannot focus just on the Soviet capability. The proliferation of chemical capability throughout the world has grown at an alarming rate. Third World countries view chemicals as a cheap and effective weapon, as was seen in the Iran/Iraq War. Forces deployed to Third World contingencies now face great risk.

The Army must continue to vigorously pursue R&D efforts in order to meet future threats. We cannot again neglect the future of R&D, as we did during the

Vietnam era, and expect to regain superiority quickly. The rate of technological change today is increasing exponentially. To provide a framework for our future modernization we are developing comprehensive plans, as outlined below.

Modernization Plans

Modernization is a continuous, dynamic process, that must be guided by a cohesive set of plans. The Army Aviation Modernization Plan (AAMP) has been completed. Soon to follow are Armor/Anti-Armor (A3), Heavy Force, fire support, air defense, truck, command and control, and technology base modernization plans. The Army Technology Base Master Plan, covered in the Tech Base section, is an essential component of our other master plans.

The AAMP is being used as a model in developing plans for the other mission areas. The AAMP looks 30 years out and provides a framework for modernizing aviation to correspond to advances in the threat, refinements in force design and warfighting requirements. The size of the overall fleet will be reduced from 8,600 helicopters today to a smaller, more capable force of about 6,600 helicopters by the end of FY94. Through the AAMP there are planned increases in production of Apache (675 to 975), Black Hawk (1107 to 2253), AHIP (135 to 375), and CH-47D modifications (436 to 472); Special Operations Aircraft will be built; safety and mission essential modifications will continue, and aging helicopters retired. The LHX, our light helicopter family of the future, is being developed with RDTE fully funded through the Five Year Defense Plan.

The AAMP encompasses the entire RDTE and Procurement aviation mission area to include all aircraft, their associated systems and repair parts. Systems will be procured at their most economic rate within AAMP funding and, where possible, through multiyear contracting. Through this integrated plan, short term solutions are avoided. Army aviation will enter the 21st century as a fully modernized combat effective force which will contribute unprecedented warfighting capabilities to the combined arms team. We want to use this comprehensive approach in all our mission areas.

Operationally, our RDA planning is guided by AirLand Battle requirements.

AirLand Battle Doctrine

AirLand Battle Doctrine seeks to exploit the full potential of US and allied forces by synchronizing all available combat means to attain that end. Modern weapons have increased the lethality of combat to the point where the outcome of engagements between large mobile forces can be determined in minutes. History has confirmed repeatedly that a relatively small but potent force striking the enemy unexpectedly can destroy a larger force. Combat power must be rapidly concentrated in tactical engagements while simultaneously degrading the operational tempo of the enemy.

To ensure unity of effort, all three areas of engagement (deep, close, and rear) are considered interrelated parts of one battle. Deep operations shape the conditions in which future close operations will be conducted. Many of our key programs are designed to keep the adversary from bringing to bear their primary advantage of mass. Rear operations assure freedom of maneuver, continuity of operations, and uninterrupted service support. The measure of

success of the deep and rear operations is the eventual impact on close operations. Close operations bear the ultimate burden of victory or defeat. The key elements which tie the total effort together and allow the combat commander to control his maneuver elements are his command, control, and communications equipment.

Weapon system programs are covered in the following pages under the deep, close and rear AirLand Battle categories to better emphasize their roles on the Combined Arms team. The combat value of our systems must be measured by their combined power which makes the sum of the parts greater than the individual contributions of the components. Conversely, our weaknesses can be seen in their true urgency in mission area context. For example, our Army now has the world's best tank and infantry fighting vehicle for mechanized warfare; however, they are currently being defended from the air threat by a 1968 vintage air defense gun. With the fielding of the Forward Area Air Defense System (FAADS), our ground forces will be defended from that air threat by the world's best air defense system. These are the kinds of weak or strong links which make or break armies.

RDA Guiding Principles

In developing the systems to support our doctrine we adhere to several principles to guide our efforts.

RDA Management

The Army has fully embraced the streamlining of the acquisition process from tailoring each system to fully complying with the Packard Commission recommendations and the derivative National Security Decision Directive 219. Our reorganization has resulted in a shortened and direct reporting chain for major defense acquisition systems. The three tier reporting chain for program management consists of an Army Acquisition Executive (AAE), Program Executive Officers (PEO's), and Project/Product Managers (PM's). This three tier reporting chain eliminates intermediate headquarters from the decision process and provides PM's with great flexibility to perform day-to-day activities on assigned programs.

The current PEO organization has been further streamlined to 14 PEOs and 1 direct reporting PM. In the original reorganization implementation there were 22 PEO and 3 independent PMs. The new structure consolidates PMs to allow better span of control and redistribution of assets within the acquisition community. The Army has incorporated the latest policy changes in the revised Army Regulation 70-1 (Systems Acquisition Policies and Procedures).

Streamlining the decision making process is allowing for better, more concentrated management of programs which will result in lower costs and more coherent, stable acquisition programs in the future.

Total Quality Management

Total Quality Management (TQM) is a key management initiative organized toward continuous process improvement activities in a totally integrated effort toward improving performance at every level. The TQM approach is to manage the processes which govern the quality and availability of goods and services rather

than the more traditional approach of inspecting quality into the product. TQM capitalizes on such value added strategies and techniques as Acquisition Streamlining, Could Cost, Productivity and Reliability, Availability and Maintainability programs. Every individual's contribution is actively sought to upgrade quality. Organizations which practice TQM are characterized by quality trained and motivated employees working in an environment where managers encourage creativity, initiative and trust, not large quality staffs! Our goal is to increase quality and productivity by making the TQM management approach an integral part of every functional activity in the Army - at all levels, in every organization, government and industry. TQM implementation promises long term productivity and quality improvement and better support to the soldier in the field.

Acquisition Management Mission Cluster Group

DOD has defined acquisition as the conceptualization, initiation, design development, test, contracting, production, deployment and logistics support of weapons and other systems, supplies or services to satisfy Army needs intended for use and/or support of DOD missions. Efficient management of the acquisition process requires well-trained, broad-based and multidisciplined managers. To fill this need the Army Acquisition Executive developed the "Acquisition Management Mission Cluster Group." This Group will provide joint military and civilian oversight for the development, training and retention of the Selected Acquisition Managers who will support the Program Executive Officers, Program Management organizations and select participants from Matrix Support Commands. The Group responsibilities include acquisition career development policy, definition of training methods, career progression patterns, career tracking and inventory, and training funding to establish and maintain a broad-based, healthy inventory of capable military and civilian acquisition managers ready to serve at all levels of management.

Multiyear Procurement (MYP)

MYP enhances program stability, encourages economic production rates, and saves money. The Army strongly supports multiyear contracting while recognizing it is not suited to every materiel acquisition. The Army will continue to evaluate each potential MYP candidate, balancing advantages against constraints individually, and supporting multiyear acquisition strategy whenever possible. For FY90-91, the Army will submit the following MYP candidates for Congressional approval: Bradley Fighting Vehicle System, Stinger (RMP), Stinger (Pedestal Mounted), Palletized Loading System (PLS), Family of Medium Tactical Vehicles (FMTV), High Mobility Multipurpose Wheeled Vehicle (HMMWV), PATRIOT, Abrams tank and the AH-64 Apache.

Competition

We are also committed to competition. All major systems and components currently in development are reviewed early on in the acquisition process to minimize inhibiting factors and enable consideration of all reasonable competitive alternatives. The Army's Competition Advocate serves as the Army's spokesman for competition and maintains an active liaison with Congress, industry, the media and DoD/Army Competition Advocates. The Army exceeded its FY88 competition goal of 60 percent by awarding 61.6 percent of 33.8 billion available dollars competitively. Total procurement dollars awarded

competitively were 18.5 billion out of a total 29.9 billion available for competition. Additionally, 93.2 percent of the contract actions were avarded competitively. Other significant achievements included a decrease in quality deficiency reports for the third year. This trend indicates that quality is not being sacrificed for increased competition.

MANPRINT

The individual soldier comes first in all our RDA efforts. To that end we have instituted MANPRINT, the manpower and personnel integration program. MANPRINT focuses attention on manpower, personnel, training, safety, health hazard, and human factor engineering considerations during system design development, production and product improvement. The result is optimized performance of both the equipment and the soldier as integral parts of the system. Ultimately, this will reduce the demand for skilled manpower as well as the operations and support (O&S) costs associated with new or improved materiel. Using computer models which simulate both the human figure and the equipment, the total system design can be greatly refined even before prototypes are built.

MANPRINT results in positive innovations. For example, the T800 engine was developed for the LHX such that no special skills or tools are required to maintain it. Further, less than 10 tools are required by the user. Another example is the Howitzer Improvement Program where MANPRINT analysis led to reducing the crew from 5 to 4, and changes to the automatic fire control system that made it easier to use.

To sum up we are making a diligent effort to manage our RDA programs in a balanced, affordable way to equip our soldiers with the quality equipment they need to prevail in case of war. This is a definite challenge in a period of declining fiscal resources, but with your continued support the Army's RDA posture will remain, in fact, a credible element of national and international deterrence.

CLOSE OPERATIONS

Close operations are engagements fought by infantry, armor, aviation, engineer, and field artillery soldiers and other supporting arms at the Forward Line of Troops (FLOT). These are the front line soldiers, and their job is to close with and destroy the enemy by the direct application of combat power. To accomplish their mission, they must be organized into units that are well trained, well led, and that have modern equipment to give them the qualitative edge necessary to fight and win.

The predominant weapons systems of the close battle are the tank, the infantry fighting vehicle, and the attack helicopter. Our forces equipped with these direct fire weapons and organized into combined arms teams are the nucleus of all our modern heavy divisions. The process of modernizing these systems must continue. Yesterday's "high end" of the high/low mix will soon be the low end as a result of changing threats and technological improvements. The following paragraphs will describe the key close battle systems requested in the FY90 budget.

The Abrams tank is the cornerstone of our conventional defense and armor modernization. Delivery of the basic M1 tank was completed in June 1986 and feedback from tactical commanders and troops in the field has been highly positive. The M1 has performed superbly in NATO REFORGER exercises and gunnery competition.

Abrams Tank - Cornerstone of Conventional Defense

The Army continues to improve the Abrams tank fleet to maintain qualitative superiority and address the quantitative superiority of the Warsaw Pact. In 1985 production began of Abrams Block I (M1A1), equipped with the 120mm cannon (versus 105MM for the basic M1), armor enhancements, and an NBC overpressure and micro-climate cooling system. These tanks will continue in production through the FY91 procurement. Although the M1 is being replaced in Europe by the M1A1 Abrams, the M1 is a highly effective combat system and continues to be fielded to active and Reserve Component units in the US and Korea.

Abrams - Fire Power

In FY90, the Army will procure 448 M1A1 tanks and begin the acquisition of long-lead materiel required to produce Block II (M1A2) configured Abrams in FY91. Block II will add enhanced survivability features as well as operational improvements to the vehicle (candidate improvements include a distributed data and power architecture, the Commander's Independent Thermal Viewer, Improved Commander's Weapon Station, Carbon Dioxide Laser Range Finder, and Position/Navigation equipment) to make it a more formidable opponent against the threat envisioned for the mid-1990's and beyond.

The RDTE effort in both FY90 and FY91 will begin to orient on the introduction of Block III for production beginning in FY96. This tank will include a more lethal main armament system, improved drive train and suspension, and improved modular armors that will make it the most effective tank on the battlefield into the 21st Century. Envisioned to be competitively developed and procured, Block III will be the foundation upon which the Army's next generation of heavy combat vehicles will be built.

Abrams - Cross Country Mobility

FY90 will be the second year of joint Army-USMC procurement of M1A1 tanks. The USMC FY90 procurement is for 155 M1A1 tanks. Egypt will begin co-production of M1A1 tanks effective with the FY90 funded delivery period.

Bradley Firing TOW

Bradley Fighting Vehicles (BFV) provide the mechanized infantry with a full track, lightly armored fighting vehicle, and scout and armored cavalry units a vehicle for their screening, reconnaissance, and security missions. The BFV can maneuver and fight during day or night, providing accurate fire while on the move. It has the cross country mobility to operate in tandem with the Abrams tank. The BFV is equipped with the 25MM cannon, 7.62MM coaxial machine-guns, and TOW anti-tank missiles. The more lethal TOW 2 missile has been incorporated into Bradleys fielded since 1987.

Bradley Behind Cover

As of December 1988, 33 battalion size units have fielded the BFV, of which four are Army National Guard battalions. The FY90 procurement provides for 600 vehicles. BFVs procured in FY90 are the survivability enhanced M2/M3A2 versions, containing improved armor, spall liners in the troop compartment and limited fuel and ammunition restowage. These enhancements will provide our soldiers with the most advanced fighting vehicle in the world. RDTE efforts in FY90 continue ammunition restowage/compartmentation and 25mm ammunition development.

Bradley With Reactive Armor

Since the start of WII there has been an evolving competition to gain advantage in the tank-antitank equation. The main offensive weapon of both the US and Soviet ground armies will be the modern tank with its matching infantry fighting vehicles. The antitank systems opposing that force are equally important. Advances in technology have caused the tank-antitank equation to broaden into what we call Armor/Anti-Armor (A3), because what is changing now is not so much the thickness of the steel and the caliber of the gun but the form and composition of the tank itself. Applications of composites, laminates, ceramics and metallurgic techniques have signaled a change in the nature of the tank. Technologies of antitank weapons must also change. Today A3 must address "armor" both as a technology and a tactical concept, and Anti-Armor, which includes everything designed to defeat armor including artillery, ground combat vehicles, mine warfare, army aviation and close air support, coupled with recently developed target acquisition technology.

Armor/Anti-Armor Modernization Plan

The Armor/Anti-Armor Special Task Force (A3 STF) was chartered by the Chief of Staff to develop an Armor/Anti-Armor Modernization Plan for the Army. That plan will provide for adequate growth in the Army's Armor/Anti-Armor capability when compared to expected Soviet improvements in the mid- and far-term. The plan provides for a combined arms Armor/Anti-Armor capability for both the heavy and light forces, and is supportive of both AirLand Battle Doctrine and AirLand Battle-Future operational concept. Material programs, training strategies and supporting analyses are incorporated in the modernization plan. The provisions of the plan are reflected in the Army's FY90/91 Budget Submission and associated FY90-94 Five Year Defense Plan.

Heavy Force Modernization Plan

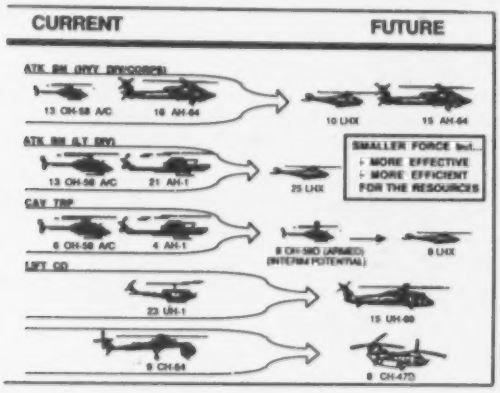
The HFMP concept envisions the heavy combined arms force and its support systems being designed and developed for maximum warfighting capability within resource constraints. Periodic improvements are planned from the outset to ensure timely incorporation of both

evolutionary and revolutionary technologies. Developing, producing and fielding future weapons systems on a common chassis with compatible survivability and mobility are central to this plan. Execution of this strategy requires an expeditious approach, maximizing industry involvement and competitive opportunities.

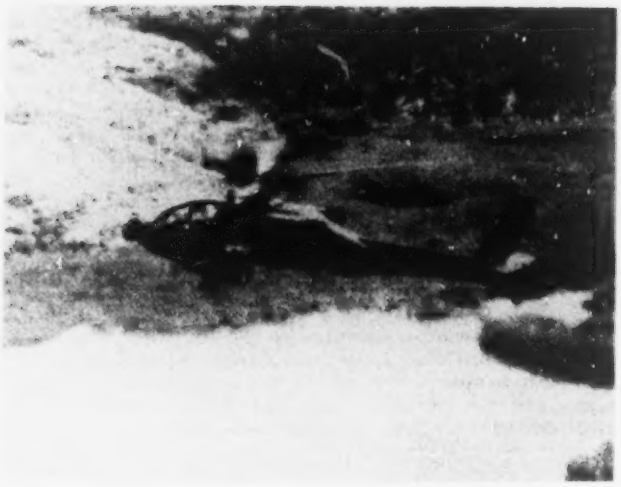
The initial package of variants will consist of the Block III Tank, Combat Mobility Vehicle, Advanced Field Artillery System, the Future Infantry Fighting Vehicle on a heavy level protection chassis, and the Line-of-Sight Anti-tank (LOSAT) and Future Armored Resupply Vehicle on a medium level protection chassis. The first variant, the LOSAT, is scheduled for fielding in the mid 1990's. The Block III Tank will be the lead vehicle of the heavy protection level chassis.

The Army Aviation Modernization Plan has already been described in the introduction. One of the major premises in developing this plan has been that funding will continue to be constrained so that older aircraft need to be retired with a concurrent force structure reduction. The chart below depicts this more capable, downsized force.

Aviation Modernization Plan



A major objective in balancing the six major aircraft category capabilities in the AAMP - attack, reconnaissance, lift, cargo, intelligence and electronic warfare, and special operations aviation - is to ensure that every weapon system procured achieves its full potential in combat. The synergy achieved by an aviation force fully integrated with the other members of the combined arms team is readily apparent in the capacity of attack helicopters to rapidly concentrate combat power.



AH-64 Apache

A quick-reacting attack helicopter fleet can disrupt and destroy moving armored columns and other high value targets wherever an enemy is attacking. The AH-64 Apache has been designed to provide this capability as a principal anti-armor weapon, complemented by the AH-1F Cobra.

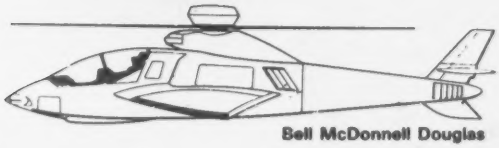
Apache Firing Hellfire

The Apache is highly mobile and capable of providing direct and indirect aerial fire during day, night, and limited visibility operations. The main armament of the Apache is the highly lethal and accurate Hellfire missile. Various combinations of Hellfire, Hydra-70 rockets, and 30MM ammunition may be employed depending upon mission

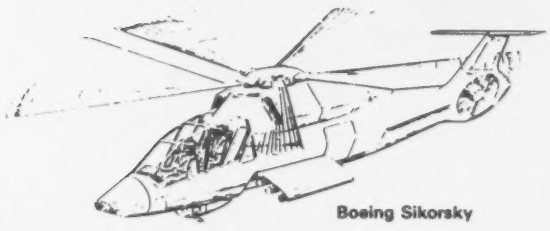
requirements. As of January 1989, 437 Apaches have been delivered and 402 fielded. FY90 R&D money continues the Airborne Adverse Weather Weapon System (AAWWS), which is being developed to provide a fire-and-forget Hellfire anti-armor missile. This will allow the Apache to remain hidden from anti-aircraft fire shortly after firing the missile. There are 11 AH-64 Attack Battalions deployed and ready for combat including four battalions deployed to Europe. The program calls for a total procurement of 975 AH-64s for a force structure of 48 Attack Battalions.

LHX DEMONSTRATION/VALIDATION

Light Helicopter (LHX)



Bell McDonnell Douglas



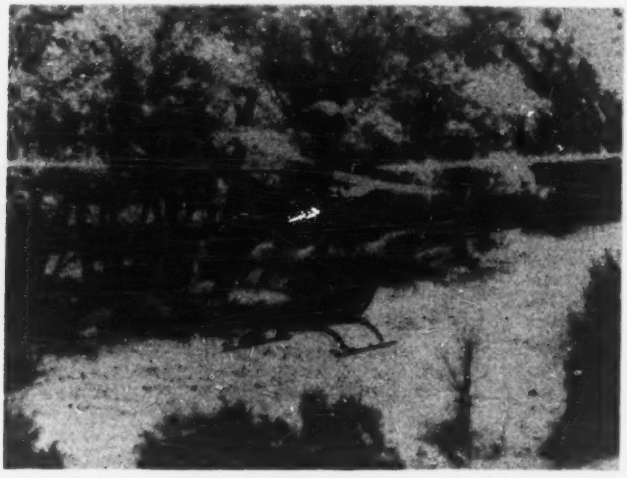
Boeing Sikorsky

LHX will replace the AH-1, OH-6, and OH-58 light helicopter fleet and complement the AH-64. The light fleet is approaching obsolescence and will be unable to meet the growing Soviet threat of the mid-1990's and beyond. Missions of LHX include armed reconnaissance and light attack with an inherent air-to-air capability. The LHX will provide a highly reliable, easily maintained weapons system with the lethality and survivability necessary for deployment on the battlefield of the future. LHX will have enhanced combat capability through the use of advanced technologies in the Mission Equipment Package (MEP), airframe and engines. Enhancements in target acquisition, night pilotage and navigation systems expand the warfighting capability of Army aviation into the hours of darkness and adverse weather.

Demonstration/Validation (DEM/VAL) of LHX, which began in November 1988, will support the December 1990 Full Scale Development (FSD) decision. DEM/VAL objectives are the demonstration of key MEP components, the definition of a common MEP architecture for LHX and future block upgrades to the current production helicopter fleet, and the final definition of performance requirements. DEM/VAL and FSD schedules support an initial operational capability for the LHX in November 1996.

LHX will be powered by two, 1200 shaft horsepover T800 engines. The T800 is continuing on schedule, on cost, and exceeding performance estimates. The T800 engine employs advanced engine technology to obtain a high power to weight ratio with low specific fuel consumption. Preliminary flight rating testing will be completed in 1989 followed by engine qualification testing.

LHX is a key conventional force initiative that will enhance the conventional warfighting capability of the Army while remaining within constrained force structure and funding projections.

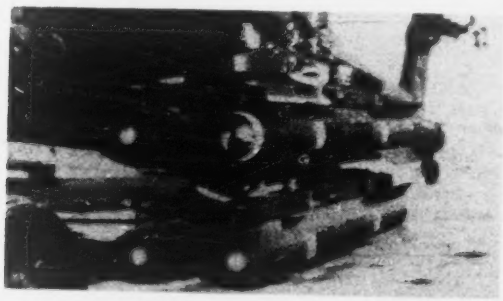


Army Helicopter Improvement Program (AHIP)

Scout helicopters perform the vital reconnaissance mission as well as intelligence, surveillance and target acquisition and designation. The Army Helicopter Improvement Program (AHIP), or OH-58D, gives the Army the finest scout helicopter in the world. AHIP employs a thermal imaging system, laser range finder/designator and high power television incorporated into a mast mounted sight that provides superior detectability and survivability. Operating day or night under hot and adverse weather conditions, AHIP provides command and control, target acquisition and target designation. The Army intends to purchase 375 AHIP's for fielding in Cavalry and Field Artillery Aerial Observation units. Air-to-Air Stinger capability, which is incorporated into AHIP beginning in FY90, will provide security against threat aircraft.

AHIP Under Cover

Hellfire is a laser guided missile that has a longer standoff range and shorter time of flight than the TOW missile system. It can be employed in a wide variety of modes including autonomous, ground remote, airborne remote, direct or indirect fire, and rapid or ripple fire. Hellfire is currently produced by Rockwell International and Martin Marietta. Rockwell is currently behind schedule in missile deliveries due to technical problems which were resolved in November 1988; they expect to recover schedule in June 1990. Martin Marietta is delivering on schedule, thus the Army and Navy requirements are being met.



Hellfire Missile

Hellfire has been in full production since 1986. FY90 funds are for 3102 missiles. Ongoing missile lethality improvements to defeat the future threat include an improved tandem warhead, and digital autopilot which will be cut into production in FY90 and FY93 respectively. Future improvements of the laser seeker are planned to enhance the missile's capabilities against countermeasures. These improvements will ensure the Hellfire's effectiveness into the 1990's.

Other direct fire anti-armor weapons available to soldiers conducting close operations include the TOW and AAWS missiles.

TOW 2 Missile

TOW has been the Army's primary heavy antiarmor/assault weapon system since 1968. It is employed on the Improved TOW Vehicle (ITV), the Armored Personnel Carrier, the High Mobility Multipurpose Wheeled Vehicle (HMMWV), the AH-1S Cobra Helicopter and the Bradley Fighting Vehicles. TOW continues to be improved to meet the latest armor threats. The TOW 2A was fielded in 1987; it will be followed by the TOW 2B, a top attack version of the missile currently under development. The TOW 2B is scheduled to be cut into production in FY90. Improvements to the system concentrate on increasing its lethality against the evolving threat while increasing gunner survivability.

Advanced Antitank Weapon System - Medium

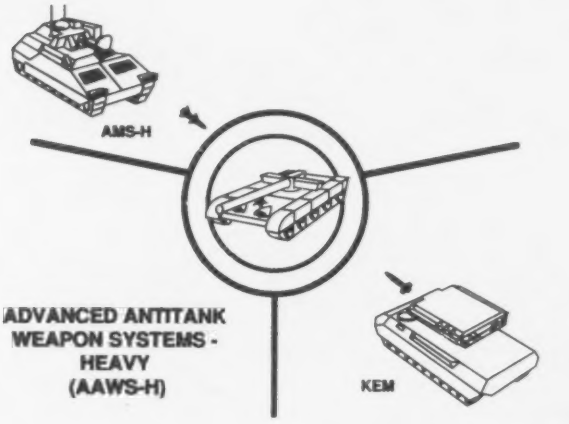
The AAWS-M is the highest priority development program for our dismounted infantry forces. It replaces the Dragon, which has been in the field since 1972 and has considerable deficiencies. The AAWS-M program will give the infantryman a medium antitank weapon system portable by one man, and capable of defeating the projected Soviet armor threat. It will allow the soldier to operate effectively in battlefield environments filled with obscurants and electro-optical countermeasures. An Imaging Infrared AAWS-M currently under development will guide the missile to its target. The proof of principle flight tests and warhead lethality tests were completed in November 1988.

Advanced Antitank Weapon System - Medium

In February 1989 the Army, with Marine Corps participation, selected one of three competing contractor teams. In 3rd Qtr FY89 the selected contractor team, Texas Instruments and Martin Marietta, will proceed into a 3-year Full Scale Development phase followed by a two-year Low Rate Initial Production in which each contractor will produce a specified number of weapons. The third year buy will begin Full Scale Production and be full competition between the two contractor teams resulting in a split buy. AAWS-M is scheduled for fielding in FY94.

The AAWS-H program will develop crew served replacement system(s) for the TOW on all platforms (Bradley, Improved TOW Vehicle, High Mobility Multipurpose Wheeled Vehicle and potentially Cobra). The different characteristics of these platforms and their unique roles on the battlefield require separate solutions. The potential thus exists for multiple systems to satisfy these requirements.

Advanced Antitank Weapon System-Heavy



AAWS-H is potentially a family of weapon systems consisting of Kinetic Energy Missile System (KEM) and Advanced Weapon System-Heavy (AWS-H). The KEM will be developed as a Line-of-Sight Antitank (LOSAT) replacement for the Improved TOW Vehicle dedicated antitank system; the AWS-H will eventually be developed as the replacement for TOW. KEM and AWS-H will be capable of operating out to maximum range of direct fire combat engagements, will provide a greater rate of fire than TOW and will perform day or night in adverse weather, and through obscurants.

KEM is in the Proof of Principle phase, to be completed by 4th Qtr, FY90. KEM, a joint Army/Air Force/Marine Corps program, is demonstrating the basic concept. In August 1988 the Chief of Staff of the Army approved the decision to accelerate the KEM prototype development effort.

AWS-H efforts are geared toward fire control improvements for current and future missiles. An RFP was released in September 1988 for the Imaging Infrared (IIR) seeker Technical Demonstration.

Full Scale Development is scheduled for FY91 with competitive selection of a contracting team for AWS-H and KEM that will compete in first production beginning FY94.

M109 155 MM Howitzer Improvement Program (HIP)

The M109 provides the primary indirect fire support to the maneuver brigades of armored and mechanized infantry divisions. Ongoing modifications will extend its useful life to the 21st century. Low rate initial production (LRIP) of 19 M109 HIP modification kits will begin during FY89, following completion of operational testing. When fielded in FY91, the M109 HIP will have the capability of autonomous operations with its onboard fire control system and positioning/navigation system, with significantly improved survivability, responsiveness and reliability. In FY90, 40 modification kits will continue the LRIP phase. A total of 1,700 M109A2/A3 howitzers will receive the HIP modification. The M109 Howitzer Improvement Program is a cooperative program with Israel.

Light Howitzer M119

Initial fielding of the M119, the Army's new lightweight 105MM howitzer, is scheduled for December 1989. The M119 will add needed firepower and improved range and reliability to rapidly deployable light infantry, airborne and air assault light divisions. The M119 is towable behind the HMMWV and air transportable by the Black Hawk helicopter. It is a nondevelopmental item (NDI) procurement of the L119 British Light Gun. In FY90 all production shifts from the UK to the US arsenal system and procures 75 howitzers. The Army intends to purchase 548 weapons.

Multiple Launch Rocket System

MLRS is a free flight, multiple launch rocket system with a Dual Purpose Improved Conventional Munitions (DPICM) warhead. MLRS supplements cannon artillery fires by delivering large volumes of firepower in a short time against critical, time-sensitive targets. The MLRS system includes the M270 self-propelled tracked launcher, disposable launch pod containers (LPC), and rockets. The launcher carries two LPCs of six rockets each, a total of 12 rockets. System growth is planned by adding Terminal Guidance Warhead (TGW), chemical warhead, Sense and Destroy Armor (SADARM), and Army Tactical Missile System (ATACMS). Twenty-four MLRS batteries have now been fielded and six POMCUS batteries are in place. The FY90 program continues the second MLRS Multiyear Procurement (MYP). In FY90 and FY91 the Army will procure three batteries in each year. European production of MLRS launchers and rockets is scheduled to begin in 1989.

Armored Combat Earthmover (ACE)

The M9 ACE has impressed field commanders with its diverse capability since its initial fielding in 1986. The ACE is a highly mobile, armored earthmoving vehicle that can dig, doze, haul and scrape. The ability to perform these tasks with forward elements assures that friendly force momentum is maintained in the offense, that enemy forces are slowed, channelized and made more susceptible to friendly fire in the defense while providing protected positioning from which our weapon systems can fight. It is fast enough (up to 30 mph) to keep pace with modern tanks on the battlefield and offers the operator protection from small arms fire, artillery fragmentation and NBC agents. Earthmoving operators in Vietnam were unprotected and vulnerable to small arms fire. The ACE will significantly enhance the support role of combat engineers on the modern battlefield.

The 7th Infantry Division (light) was the first unit equipped with seven of the low rate initial production (LRIP) vehicles. Deliveries of the full production vehicles to the field is scheduled to begin in the March-June 1989 time frame.

In FY90 the program will buy an additional 132 ACEs.

Nuclear, Biological, and Chemical Reconnaissance System (NBCRS)

Nuclear, Biological, and Chemical Reconnaissance System (NBCRS)

The NBC Reconnaissance System (NBCRS) is a fully integrated NBC detection, warning and communication system that will be used in conjunction with conventional reconnaissance elements. The system will detect, identify, and mark areas of NBC contamination; collect and store soil, water and vegetation samples for later analysis; designate lanes of clear passage for troop movement; and transmit NBC information to area commanders. This is a new concept which does not replace an old system. Basis of issue is 6 per heavy division and armored cavalry regiment; 36 per corps. The first unit equipped will be in the early 1990's. An improved version of the NBCRS will be fielded in the middle to late 1990's.

120MM Mortar

The 120mm mortar is a Nondevelopmental Item (NDI) procurement to replace the WWII vintage 4.2 inch heavy mortar used in heavy divisions. The system will be employed in two variants: a toved version and a carrier version that will be mounted in the M106A2 Mortar Carrier. The weapon and a family of nondevelopmental ammunition is currently undergoing testing for type classification during 1989. Initial fielding of the toved variant is scheduled for 4th Qtr, FY90 to the 9th Infantry Division. 167 mortars will be procured in FY90. The 120mm mortar will provide better growth potential as a result of the larger cartridge, training commonality with the 60MM and 81MM mortars, improved range, and interoperability with more of our NATO partners. The 120mm mortar program includes development of a family of enhanced ammunition (HE, Smoke, and Illumination). Initial fielding will be limited to HE and Smoke rounds.

Small Arms

A remaining area of importance in the close operations area is the direct fire of the infantry, small arms.

The most notable small arms systems currently in procurement include the M9 Personal Defense Weapon, M16A2 Rifle, the M249 Squad Automatic Weapon (SAW), and the MK19-3 40MM Automatic Grenade Launcher. All of these small arms programs are on multiyear contracts.

The M9 is a 9MM semi-automatic pistol designed to replace the .45 and .38 cal pistols in the DoD inventory. It is capable of firing NATO standard 9MM ammunition. Procurement has been ongoing since 1985 with over 140,000 pistols already delivered. A follow-on multiyear contract for the 9MM will be awarded in late FY89.

The M16A2 is an improved version of the M16A1 and is being issued as the Army's primary combat rifle. It is a lightweight, air cooled, gas operated, low impulse rifle firing from either twenty or thirty round magazines. To date, over 223,000 weapons have been fielded. Some M16A1 rifles will be converted to the M16A2 during depot overhaul using modification kits.

Squad Automatic Weapon (SAW)

The SAW is a lightweight, one-man-portable machine gun designed to replace the two M16A1 Automatic Rifles in each infantry squad (on a one-for-one basis). Like the M16, the SAW is a 5.56MM weapon. It is capable of a cyclic rate of fire of 750 rounds per minute with a maximum effective range of 800 meters. The SAW is currently in its second procurement and has been fielded both in light and heavy US forces both in the CONUS and OCONUS.

The MK19-3 40MM Automatic Grenade Launcher is an ongoing procurement initiated by the Navy and assumed by the Army in 1988. The weapon will replace some M2 (.50 cal) and M60 (7.62mm) machineguns on a variety of vehicles. It is effective at ranges up to 2200 meters. The weapon is capable of a cyclic rate of fire of 325 rounds per minute and will provide significant additional fire power to front line units as well as combat support units engaged in rear area combat operations.

Ammunition Modernization

A critical part of Army modernization is the modernization of ammunition across the spectrum of the battlefield. New munitions to be fielded during FY90 include the 120MM and 105MM Kinetic Energy Tank Rounds, 105MM High Explosive Rocket Assisted (HERA) howitzer cartridge, 120MM mortar weapon system ammunition, and the Product Improved VULCAN Air Defense System (PIVADS) 20MM ammunition, and two new mine systems: Multiple Delivery Mine System (VOLCANO) and Modular Pack Mine System (MOPMS).

These new munitions will enhance and increase range and lethality of existing weapon systems. The 105MM Kinetic Energy Tank Round will greatly enhance the armor-killing capability of the 105MM M1 series tanks. The HERA projectile will increase both range and lethality of artillery support for light Infantry forces. The 120MM mortar ammunition will enhance mortar fire support throughout the force. The new PIVADS' 20MM cartridge, with greater range and lethality, will enhance ground forces' defense against enemy aircraft. The fielding of these munitions will significantly improve Army combat power throughout the active force.

Ammunition Modernization

In support of the tank modernization program, the Army must continue the vigorous R&D effort in the Armament Enhancement Initiative (AEI) arena where previous efforts are now coming to fruition. The fielding of AEI rounds meets the lethality requirements imposed by the battlefield introduction of advanced Threat armor. For the same reason, the Wide Area Mine (WAM) must continue as a high priority development item.

The modernized 155mm Artillery-Fired Atomic Projectile, will provide improved range, lethality reliability, and command and control over its predecessor when fielded in the 1990's. It will provide advantages in survivability and effectiveness of tactical nuclear capability for US and NATO 155mm artillery units.

DEEP OPERATIONS

Deep Operations allow us to win the Close Operations by shaping the conditions in which future close operations will be conducted. The activities typical of deep operations include the surveillance and acquisition of enemy targets, the disruption and destruction of these targets through deep fires and/or maneuver, the deception of the enemy, actions to counter the command and control systems of the enemy, and the command and control of our own forces. These combined efforts prevent successive echelons of enemy forces from overwhelming our units in close operations. Our qualitative edge in equipment and soldiers can then overcome the Soviet's quantitative edge.

Currently our forces do not have the full capabilities necessary to execute deep operations to the extent envisioned by AirLand Battle doctrine. Joint programs with the Air Force provide for the majority of the deep operations requirements, but we are also developing capabilities on our own to better execute deep operations.

To enable force commanders to extend their target attack capability to more than 100 kilometers deep into the enemy's force array, the Army and Air Force are developing JSTARS. JSTARS is a battle management and target attack control system that will detect, track and assist in attacking moving and fixed tank-sized targets. The Army is specifically developing the Ground Station Module (GSM) for tactical receipt of JSTARS data while the Air Force develops the airborne platform, radar and data links.

Joint Surveillance and Target Attack Radar System (JSTARS)

Ground Station Module (GSM)

Target Information will be transmitted through the secure data links mounted on the E8 (militarized Boeing 707) airframe to multiple GSMs. The GSM will evaluate and transmit tactical data from airborne radars to Army C3I nodes at corps and division headquarters and MLRS ATACMS battalion headquarters. JSTARS will also share information with other intelligence and fire support systems.

The GSM and Airborne elements are in Full Scale Engineering Development. The Army restructured the GSM program to incorporate nuclear/blast hardening and NBC filtering into a Block II GSM configuration. A European field test demonstration with the fully operational GSM and E-8 is scheduled for FY92.

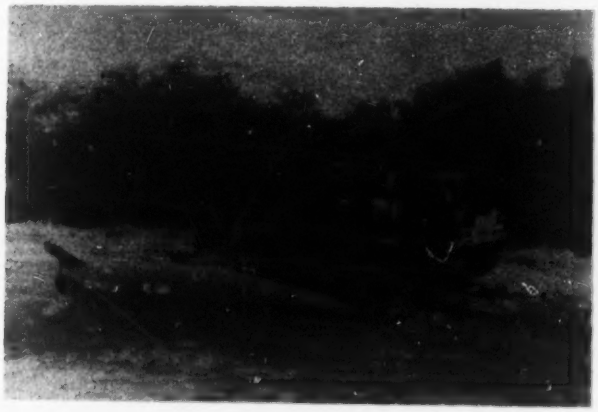
Joint Tactical Fusion Program/All Source Analysis System (JTFP/ASAS)

The All Source Analysis system (ASAS) is designed to provide field commanders with Intelligence tools necessary to successfully prosecute the Deep Attack. ASAS will automate command and control of Intelligence/Electronic Warfare (IEW) operations. It will also generate a near real-time picture of the enemy situation to guide employment of maneuver forces and systems such as the Joint Surveillance and Target Acquisition Radar System (JSTARS) and the Army Tactical Missile system (ATACMS). The ASAS will use state-of-the-art minicomputers to speed the analysis process and improve accuracy. The Joint Tactical Fusion Program is developing ASAS in parallel with the Air Force Enemy Situation Correlation Element (ENSCE).

The ASAS program employs an evolutionary acquisition strategy. The ASAS/ENSCE architecture is modular. The three major hardware modules within the ASAS/ENSCE system are: Forward Sensor Interface and Control (FSIC) module, which relays data from ground based sensors/sources in forward areas back to the data processing modules and provides the interface between the data processing modules and the area communications network; the ASAS/ENSCE Interface Module (AIM) or Dual AIM (DAIM), which processes intelligence data; and, the Portable ASAS/ENSCE workstation (PAWS), which is the primary user interface with the system.

Field trials of the FSIC and AIM took place in December 1986. A Limited Capability Configuration (LCC), comprised of the FSIC, AIM and PAWS is completing development and will be delivered to III Corps, Fort Hood, TX in March/April 1989. Force Development Test and Experimentation (FDT&E) will commence in July 1989 at Fort Hood. The Initial Operational Test and Evaluation (IOT&E) will be completed in FY91 and the Milestone III decision (production) is scheduled for 2nd Qtr, FY92. The objective system will evolve through pre-planned product improvements and software refinement based on user feedback.

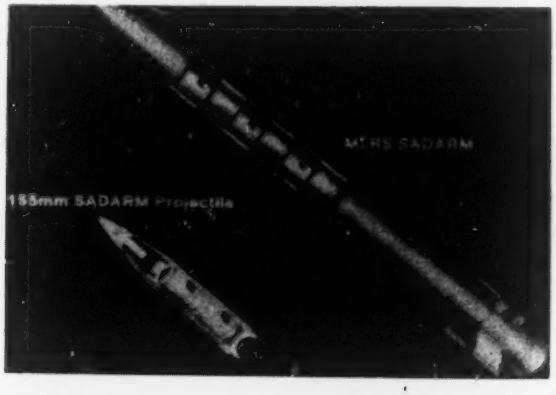
Army Tactical Missile System (ATACMS)



ATACMS is designed to engage high priority land targets at ranges beyond the capability of cannons, rockets, and the Lance Missile System. ATACMS is a conventional semi-ballistic missile that will fired from the existing Multiple Launch Rocket System (MLRS) launcher; each launcher will carry two ATACMS missiles, each with 1000 Antipersonnel Antimateriel (APAM) bomblets. To the firing units, ATACMS is just another round of crated ammunition, transported and fired from any MLRS launcher. The ATACMS thus extends the capability of the MLRS launcher and crew at no cost in terms of additional manpower or equipment to the firing units. The mission is to interdict, delay, disrupt and destroy the second echelon assault forces, command and control elements, and logistic support units. Engineering Development Testing continued through January 1989 with six of eight flights being completely successful. In the 5th and 6th flights the warhead failed to function, however, fixes have been incorporated into the warhead to alleviate failures of this nature.

MLRS Terminal Guidance Warhead (TGW)

The development of a Deep Attack Antiarmor capability is contingent upon the successful development of a smart submunition. The US is currently involved in a multinational development of a Millimeter Wave Terminal Guidance Warhead (TGW) Rocket for MLRS. Each MLRS-TGW rocket will carry three Terminally Guided Submunitions (TGSM). The MLRS M270 launcher carries two Launch Pod Containers with six rockets each: a total of 12 rockets containing 36 TGSMs. Each TGSM is capable of locating, attacking and destroying a threat armor vehicle using its Millimeter Wave (MMW) seeker and tandem shaped charge warhead. This joint venture with our European partners will help meet an urgent need to defeat hard targets such as moving and stationary armored vehicles before they are committed into the close battle. The TGW program begins Full Scale Development in FY92.



Sense and Destroy Armor (SADARM)

SADARM is a relatively low cost, sensing submunition designed to detect and destroy lightly armored vehicles, primarily self-propelled artillery. One of the Army's new family of fire and forget "SMART" munitions, SADARM will be used primarily in an artillery counterbattery role. The submunition is launched via

155mm howitzers or the Multiple Launch Rocket System (MLRS). After launch, the submunition is dispensed over the target area and searches for stationary or slow moving armored vehicles using a combination millimeter wave/infrared, dual-mode sensor. Once a target is detected, SADARM fires an explosively formed penetrator which, travelling at an extremely high velocity, perforates the top of the target.

SADARM is currently in Full Scale Development; projectile and rocket (MLRS) tests will continue through early 1992. Type Classification is projected for 2nd Qtr, FY92 and the First Unit Equipped (FUE) dates are 4th Qtr, FY93 (155mm) and 3rd Qtr, FY94 (MLRS).

NATO 155MM Autonomous Precision Guided Munition (APGM)

The US has been assigned lead nation responsibility for the 155mm Autonomous Precision Guided Munition (APGM), a NATO cooperative development program to develop an anti-armor, fire-and-forget artillery projectile to be fielded during the mid-to late 1990's. Eight NATO nations have committed their combined resources to the effort. During 1988, two international consortia were selected for award of three-year expanded feasibility contracts. Each consortium consists of firms from each of the eight participating nations. NATO APGM will complement the counterfire capability of the 155mm and MLRS SADARM submunition program, and the anti-armor capability of the MLRS Terminal Guidance Warhead (TGW) international cooperative development program.

Follow On To Lance (FOTL)

FOTL is required as a replacement for the aging Lance nuclear missile system and is essential to maintaining the NATO non-strategic nuclear triad. The SACEUR has identified a critical need for FOTL to meet the Corps and Theater Commander's requirements for delivery of nuclear fires against high priority battlefield targets of the Warsaw Pact. FOTL is emphasized as a key element of 1983 Montebello Decision which outlines nuclear modernization plans supported by NATO. The Army initiated studies and analyses for FOTL in FY88, and is continuing program development in FY89. FOTL will be a nuclear missile capable of being fired from a MLRS-type launcher giving us the opportunity to realize significant force structure and cost savings. Research and development funds in FY90 and FY91 will initiate a Full Scale Engineering Development (FSED) contract.

Special Operations Aviation (SOA)

The SOA Program will develop and procure sophisticated helicopters capable of deep penetration missions (infiltrating and exfiltrating special forces at low levels through unfamiliar mountainous terrain, at night, and in adverse weather). Phase I of the program consists of the development of one prototype and 16 production MH-47Es as well as one prototype and 22 production MH-60Ks. Phase II consists of the procurement of an additional 34 MH-47Es. To ensure our SOA pilots are adequately trained, a combat mission simulator for each type of aircraft will also be developed.

Significant features of the aircraft are: fully integrated cockpit common to both type aircraft, up-rated engines, forward looking infrared sensors, terrain following/terrain avoidance radar, and extended range fuel capacity (internal/external tanks and air-to-air refueling capability).

In FY90 the final 11 MH-47Es (Phase I) and the first 11 MH-60Ks will begin the modification process. The long lead items for the 34 MH-47Es of Phase II will also be procured. Future funds will modify an additional 11 MH-60Ks and 34 MH-47Es.

Desert Mobility Vehicle (DMVS)

The DMVS program will modify High Mobility Multipurpose Wheeled Vehicles (HMMWVs) to perform Special Operations direct action and deep reconnaissance missions in desert/arid environments. Currently, SOF operational teams lack the capability to rapidly infiltrate, exfiltrate and traverse long distances in assigned mission areas with a high probability of survival. In FY90, 63 HMMV armament carriers will be modified and the procurement of 48 trailers will be initiated.

Special Operations Forces (SOF) Communications

The Army continues to make SOF Communications a priority item. The SOF Communications program upgrades and enhances present SOF capabilities, replaces obsolete equipment and creates new technological advancements for active and reserve SOF. These communications systems support the SOF missions requiring low probability of intercept and detection in a lightweight, manportable, secure and reliable package. Fifteen separate communications programs, as validated by USCINCSOC, are supported by Army resources.

Intelligence - Electronic Warfare (IEW)

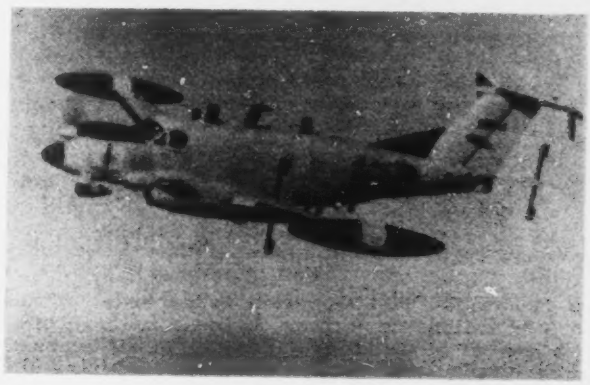
The IEW mission includes locating, deceiving, degrading or destroying Warsaw Pact C3 systems in support of battle management by the Commander. Such disruption of Warsaw Pact communications is one of the key means of slowing the timely massing of their individual units, which exercise far less autonomy than NATO units.

The Army is fielding a complementary mix of ground-based and airborne signal exploitation and jamming systems while continuing to improve IEW system capabilities. For airborne deep operations Guardrail and Quick Look perform the interception and location tasks while Quick Fix has a limited capability to perform the countermeasures task. The OV-1D MOHAWK continues to provide organic imagery collection to the Corps commander. There are also ongoing efforts to develop modular IEW sensors for Unmanned Aerial Vehicle (UAV) payloads to provide IEW capabilities for deep penetration missions.

Quick Fix

The EH-60A, Quick Fix II (which uses the Black Hawk airframe) is a tactical, electronic warfare, helibome jamming system. It gives the division commander the capability to conduct limited electronic countermeasure operations at ranges deeper than ground based systems. The First Unit Equipped date for Quick Fix II was May 1988. The Army has procured 66 aircraft.

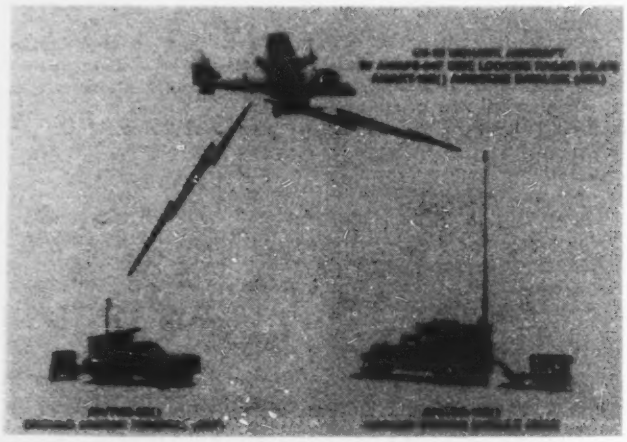
Guardrail



Guardrail is a combination of fixed-wing airborne sensors and ground processing facility which provides real time critical information about enemy C3I disposition and location in developing intelligence for combat planning, tactical maneuver, and targeting. The future Guardrail Common Sensor system, which combines communications and electronic intelligence sensors, will use the RC-12K aircraft. It will enter the inventory in early 1991. Future plans call for upgrading all Improved Guardrail V's to the Guardrail Common Sensor

configuration. The RV-1D fleet will be retired as Guardrail Common Sensor is fielded. The first unit set will be retired in FY91, and the retirement will be complete in FY95. Due to the retirement schedule no more RV-1's will be inducted into the Programed Aircraft Restoration and Service Life Extension Program (PAR/SLEP) after 2nd Qtr FY89.

The Quick Look System provides the corps and division commanders with the location and type of threat noncommunication emitters day or night in any weather conditions. Quick Look's airborne electronic equipment is mounted in the RV-1D MOHAWK aircraft. The remainder of the Quick Look system is mounted in several surface vehicles.



OV-1D Mohawk

Since its inception, the MOHAWK aircraft has been the only organic imagery collection asset available to the Corps commander. Currently, there are 10 aircraft in each Aerial Surveillance Company of the Military Intelligence Battalion, Aerial Exploitation. Imagery intelligence collection is accomplished by using Side Looking Airborne Radar (SLAR) data linked to a ground terminal and by using photographic camera systems. A limited number of Infrared (IR) sensors can also be employed on the OV-1D. Moving Target Indications (MTI) provided by the SLAR ensures efficient targeting by Corps deep strike weapons systems.

We will continue to work toward a more fully automated C3 structure, coupled with modernized weapon systems, to improve our Deep Operation's capability.

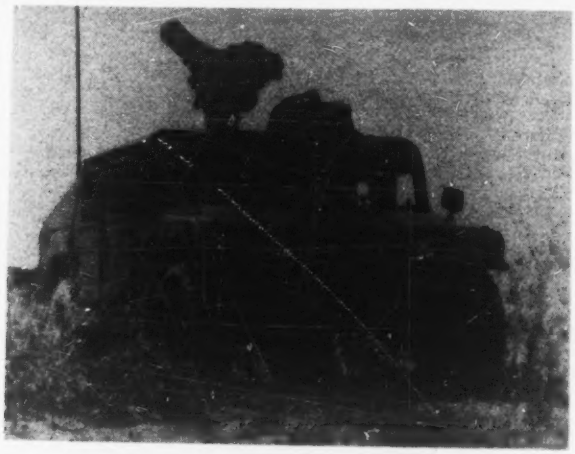
REAR OPERATIONS

Rear operations are designed to assure freedom of maneuver and continuity of operations for all activities rearward of elements in contact. Rear operations normally include assembly, movement, and positioning of reserves and long range fire support; movement, stockpiling, and distribution of war materiel; maintenance and field services; maintenance of lines of communication; and the defense against air, ground, and missile attack. At the operational level, rear operations focus on preparing for the next phase of the campaign.

Our modernization of systems needed to conduct these rear operations is progressing well. The highlights of these systems follow. As you review these systems, keep in mind that the employment of many of them will require that they operate in close and deep operations. Under normal conditions, these systems are usually based in the rear area. For example, utility transport systems such as the Black Hawk, the Chinook, and tactical wheeled transporters all enter the close operations area to deliver the supplies and personnel required to sustain these operations.

Tactical Transportation

The Army continues to upgrade its tactical wheeled vehicle fleet to provide better supply support, improved unit mobility, enhanced heavy lift for ammunition and fuel, and more capable heavy equipment transport.



High Mobility Multipurpose Wheeled Vehicle

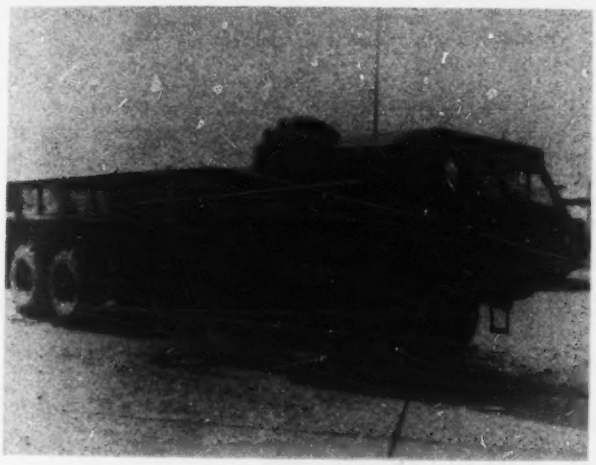
The light fleet will be strengthened by a new competitive multiyear contract for approximately 36,000 HMMWVs to be awarded in late FY89. The HMMWV has been an important addition to our light fleet in the active force, the ARNG

and USAR. It is a highly mobile, diesel powered, 4-wheel drive tactical vehicle that may be configured as a cargo troop carrier, armament carrier, ambulance, and shelter carrier. It also serves as a platform for the TOW anti-tank weapons carrier, and Pedestal Mounted Stinger.

Procurement of the SUSV supports activation of the 6th Infantry Division (Light) in Alaska. SUSV is a tracked vehicle capable of traversing snow and tundra regardless of depth in all seasons. It is used to conduct operations in northern and mountainous regions and can carry subsistence equipment, ammunitions, and supplies required by small units. It can transport 17 fully equipped soldiers or a 4,400 pound payload, and tow a trailer or light howitzer. SUSV is a Nondevelopment Item (NDI) and has four variants: cargo, ambulance, flatbed, and command and control.

The initiation of the competitive RDT&E phase of the Family of Medium Tactical Vehicles (FMTV) program in FY89 will provide an improved medium truck family using today's automotive technology to replace aging 2 1/2 ton trucks and help alleviate the critical shortage of 5 ton trucks. Our medium vehicle fleet, which is the Army's workhorse for our tactical mobility mission, will continue to endure vehicle shortages, particularly in the 5-ton class, hence the emergence and success of the FMTV becomes even more critical to our efforts to improve the medium vehicle fleet.

10-Ton Truck



We will continue to field additional 10 ton Heavy Expanded Mobility Tactical Trucks (HEMTT) from the FY89 procurement and M915/916 Line Haul Tractors. Again this year we are requesting relief from the National Defense

Authorization Act FY88/89, which directed continued procurement of HEMTTs, to obtain permission to stop procurement based on affordability and established higher priorities of other equipment. The Palletized Loading System (PLS), a 16.5 ton tractor with companion trailer and self-load/unload capability, will complete prototype development and begin production in FY90. Fielding of PLS will provide great increases in Corps ammunition distribution efficiency and productivity as well as support NATO interoperability.

The last addition to the heavy fleet is the Heavy Equipment Transporter (HETS) which will provide the ability to support, deploy and evacuate the M1 series tank. We expect to begin initial receipt of the HETS semitrailer in late FY90 while continuing testing and preparation to produce the HETS tractor in late FY91.

The Army will lay the foundations in FY90/91 for the continued improvement of all components of its tactical wheeled vehicle fleet with strong emphasis on NDI programs (FMTV, PLS, HMMWV).

Tactical Wheeled Vehicles Modernization Plan

The Tactical Wheeled Vehicle Modernization Plan (TWVMP) will provide an objective plan for equipping the Total Army with a capable, cost-effective and stable wheeled vehicle fleet through the year 2020. The goals of the TWVMP are to: (1) Fill Army Tactical Wheeled Vehicle (TWV) requirements with a capable, supportable, modernized fleet; (2) Minimize cost of ownership through a program of procurement and service life extension programs (SLEP); (3) Establish acquisition strategies for new procurements which minimize turbulence in the manufacturing base; (4) Establish a TWV useful life program as the baseline for making vehicle retirement and SLEP decisions. The plan will establish prioritized acquisition strategies for the Total Army which are executable within programmed resources, integrated distribution/redistribution strategies, and a detailed TWV program concept. The TWVMP is scheduled for completion in 1st qtr, 1989.

UH-60 Blackhawk

Blackhawk

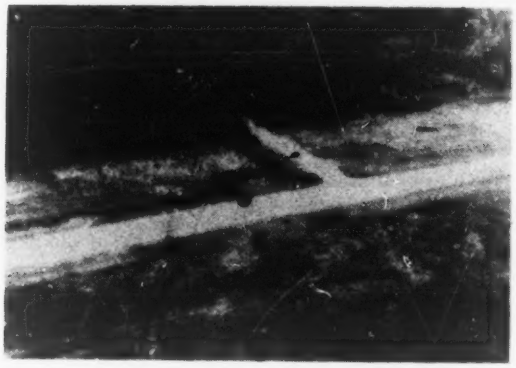
The Army's primary tactical lift helicopter is the Black Hawk, with missions of troop assault, resupply of troops in combat, command and control (C2) and aeromedical evacuation. It can move a squad of 11 troops or 8000 pounds of cargo, internally or externally, in all geographical conditions. Its enhanced survivability plus technological reliability, availability and maintainability (RAM) improvements give it a staying power never before achieved in a helicopter. More than 1000 Black Hawks have been delivered to the Army worldwide. A more powerful engine will be added, starting in 1989.

CH-47D Chinook

The "D" model improvements being incorporated into the Chinook, our only medium lift helicopter, will extend the service life of the fleet beyond the year 2000. Configured to move both internal and external cargoes, the CH-47D allows for the rapid delivery of troops and equipment.

By the end of 1988 there were 240 "D" model Chinooks in the hands of soldiers. The Chinook has achieved a mission availability rate which is five percent above the Army's standard. The planned production has been increased from 436 to 472 aircraft to be completed in 1992. FY89 completes the current multiyear contract. A second multiyear contract (FY90-92) has been signed to complete the modernization effort for the CH-47 fleet.

Chinook With Sling Load

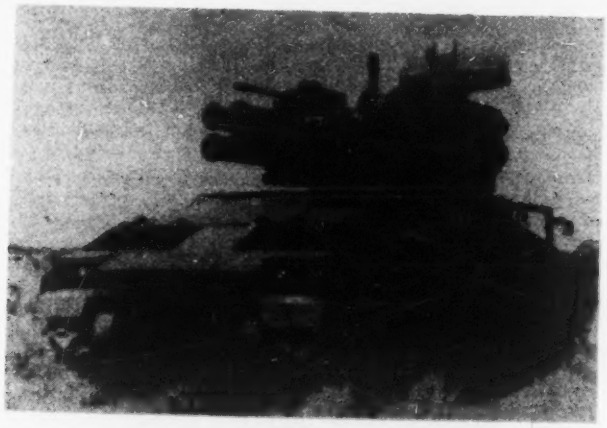


DEFENSE FROM AIR ATTACKS

Our Air Defense systems must protect all Army elements from the air threat including troop formations, depots, lines of communication, air bases, key command and control facilities, and other vital assets. A comprehensive air defense umbrella for these assets is needed at all ranges, altitudes, and for all types of operations leaving the enemy no preferred attack option. For the low altitude threat to the division we are developing and fielding the Forward Area Air Defense System. Medium and high altitude attacks are countered by the Patriot and Improved Hawk systems.

Given the improvements in threat helicopters and long range munitions, the modernization of our forward area air defense is essential. The Forward Area Air Defense System (FAADS) was initially defined by a special study group after the DIVAD Gun experience proved that one system alone, or even multiple weapons acting independently, cannot defeat the evolving Soviet air threat.

Ongoing Army programs are being combined with new technology to integrate weapons, sensors and new command, control, and intelligence systems. Relying heavily on NDI equipment and preplanned product improvements FAADS will ensure freedom of maneuver for division ground elements and protect critical division C2, fire support, and combat sustainment elements on the AirLand Battlefield.



FAADS Line of Sight Forward-Heavy (LOS-F-H)

Line of Sight-Forward-Heavy (LOS-F-H) is an NDI program. Its role is to maneuver with the Combined Arms Team. LOS-F-H must be capable of defeating the fixed wing air threat and providing long range anti-helicopter fires. After extensive testing ADATS was selected for the LOS-F-H role and will undergo full operational testing starting in October 1989. Low rate initial production (5 fire units and 60 missiles) began in FY89. Production continues in FY90 (18 fire units and 424 missiles) following operational testing and a Milestone III decision review.

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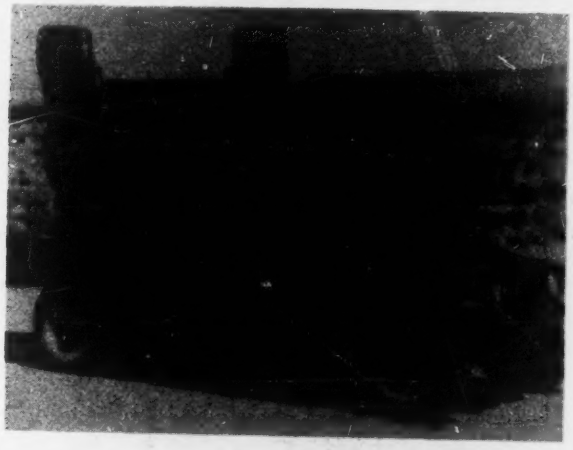
FAADS Non-Line of Sight (NLOS) Air Defense Weapon

Non Line of Sight (NLOS), or the Fiber Optic Guided-Missile (FOG-M) is a long range anti-helicopter, anti-tank system that can defeat targets masked by terrain and beyond the range of line of sight systems. Test Flights have demonstrated its capability to destroy helicopters flying up to 10 km from the firing unit. An Initial Operational Evaluation of FOG-M is in progress and ends in May 1989. FOG-M entered into Full Scale Development (FSD) with the contract awarded in December 1988. In FY90 the program will begin testing of the FSD prototype system and award advance procurement funds to support an FY91 Low Rate Initial Production (LRIP) buy of fire units and missiles.

Pedestal Mounted Stinger (PMS)



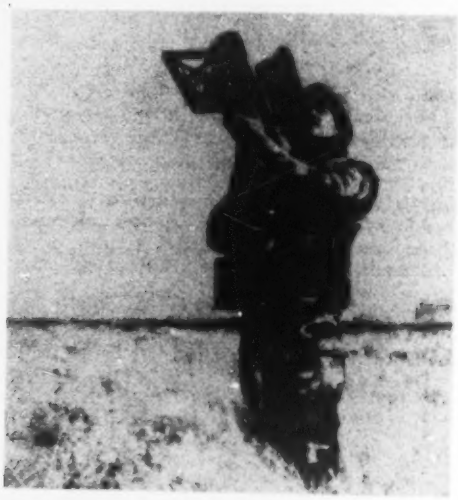
Line of Sight-Rear (LOS-R), the rearmost FAADS component, is the Pedestal Mounted Stinger (PMS), which is a lightweight, highly mobile, line-of-sight system operated by a two-man crew. Boeing's AVENGER was selected to perform this role. Utilizing the proven Stinger missile, the system provides improved reaction time, firepower day and night capability and shoot on the move capability for low altitude defense against fixed-wing aircraft and moving helicopters. PMS operates day or night primarily in the division rear areas. In FY90 the program will initiate full scale production with a buy of 122 PMS fire units.

Combined Arms Initiatives

Combined Arms Initiatives (CAI) provide ground and aerial combat elements an enhanced capability for self defense against enemy helicopters. These include Air-to-Air Stinger on selected Army helicopters, an improved Air Defense Sight on the Bradley Fighting Vehicle, and improved tank ammunition which provides both an anti-helicopter and anti-tank capability.

FAAD C2

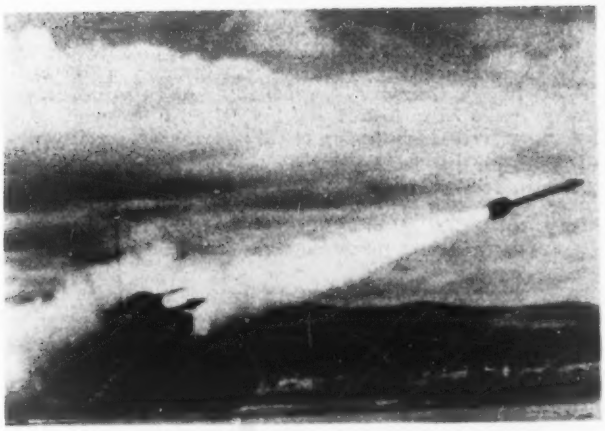
FAAD Command, Control, and Intelligence (FAAD C2I) is an integral part of FAADS which integrates the weapon system components into a synergistic system of systems by providing rapid and reliable (1) targeting; (2) air situation; and (3) air battle management information. FAAD C2I consists of four separate but interrelated efforts: Command and Control (C2) Hardware and Software, Ground Based Sensors, Masked Target Sensors, and Identification equipment. Starting in FY90 the program will begin testing of C2 Software and certification of the Post-Deployment Realtime Interactive Simulation System, which will be used to test and verify future C2 software operations. An NDI proposal for the Ground Based Sensor is now under evaluation. Funding for the Masked Target Sensor has been deferred until FY92. Also, in FY90 two Identification devices will enter production and two will enter the demonstration/prove out phase.



Stinger (POST) and Stinger (RMP)

Stinger is an advanced manportable, shoulder fired air defense missile system. The Basic Stinger, fielded in 1981, uses a passive infrared (IR) homing seeker to guide on the target. An improved seeker, Passive Optical Seeker Technique (POST), which entered production in 1983, improves Stinger performance in an infrared countermeasures environment by the addition of an ultraviolet (UV) channel in the seeker and a new scanning techniques. The Stinger-Reprogrammable Microprocessor (RMP) entered development in 1984 and transitioned to production in 1985. It places all key missile guidance functions under software control. This allows the missile to be modified by software changes in an external module, rather than making expensive hardware changes to overcome future threats. Deployment of the Stinger-RMP is scheduled for FY89. Applications include Line of Sight-Rear (LOS-R), also known as the Pedestal Mounted Stinger (PMS), and the Air-to-Air Launcher mounted on selected helicopters. The FY90 Stinger-RMP program buys 4754 missiles. The Stinger-RMP Security Interlock was successfully demonstrated in October 1988.

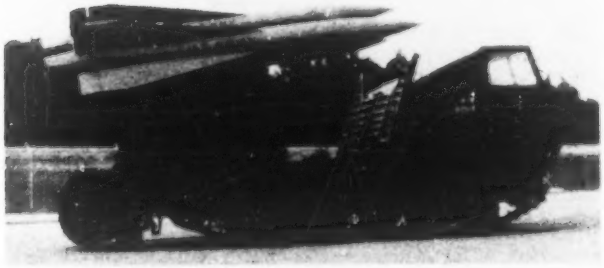
Chaparral - Short Range Air Defense



Chaparral provides short range air defense against low altitude air attack of forward deployed divisions and corps and theater rear areas. The Rosette Scan Seeker (RSS) guidance system was developed to provide improved infrared countermeasures. Other improvements include FLIR optical improvements, and a Nuclear, Biological and Chemical Collective Protection system.

The FY90 request will procure 422 RSS missiles. The Army National Guard will equip four battalions with Chaparral fire units by the end of FY89.

Hawk - Protects Against Low to Medium Air Attack

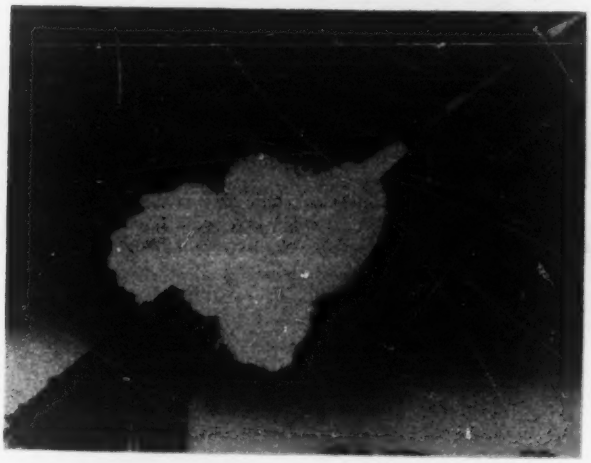


The HAWK medium range missile system provides vital air defense against low to medium altitude air attack of air bases, critical logistics installations, and corps air defense priorities. The FY90 funds will continue procurement of Phase III kits which will increase firepower and improve mobility and operator training as well as provide chemical collective protection equipment. The systems' field maintenance equipment (FME) is also being upgraded to further reduce manpower needs and improve operational availability. These product improvements will keep HAWK effective through the year 2005.

Hawk - Protects Against Low to Medium Air Attack

The Medium Surface to Air Missile (MSAM) System is a potential replacement for both Hawk and Chaparral in the US Army and Hawk in NATO countries. MSAM is projected to be a highly mobile and survivable system with a high volume of firepower and low manpower requirements. MSAM would be a cooperative development to support both US and European air defense requirements.

MSAM



PATRIOT - Protects Against Medium to High Altitude Threat

PATRIOT is our long range surface to air missile system which protects against the medium to high altitude threat. In future combat we must be ready for saturation raids by large numbers of sophisticated aircraft using intense electronic countermeasures. PATRIOT is designed to meet that threat with its fast reaction time, multiple engagement capability and ability to operate in a severe electronic countermeasure environment. Nine PATRIOT battalions are currently operational with one additional battalion scheduled to join our forces during 1989.

The FY90 request will provide funds for 3 fire units and 815 missiles, as well as for Ground Support Equipment that will be provided to Italy under a Memorandum of Understanding between the U.S. and Italy. The Federal Republic of Germany and the Netherlands are also participating in PATRIOT acquisition programs to provide for cooperative air defense improvements. The first NATO unit was delivered in 1986, and discussions continue with other interested NATO allies. Japan has also been licensed for the production of 26 fire units.

Joint Tactical Missile Defense (JTMD)

The Joint Tactical Missile Defense Program (JTMD) is designed to counter the Soviet Tactical Ballistic Missile (TBM) threat. A significant TBM threat remains even after the INF Treaty eliminated missiles with ranges greater than 500 kilometers.

TMD consists of four elements: (1) Active Defense to destroy missile in flight, (2) Passive Measures to reduce vulnerability to enemy attack, (3) Attack Operations to destroy launchers and associated equipment on the ground, and (4) C3I to link all elements together.

The Army is currently concentrating on Active Defense by upgrading the PATRIOT Missile System. PATRIOT Anti-Tactical Missile Capability (ATM) Phase 1 (PAC-1) involving software upgrades was fielded in July 1988. PATRIOT ATM Capability Phase 2 (PAC-2), consisting of a new warhead and fuze, will be fielded in the early 1990's. Negotiations are also on-going with the Federal Republic of Germany to create a Nunn cooperative program for the development of a Multi-Mode Seeker for the PATRIOT missile that provides a capability greater than PAC-2.

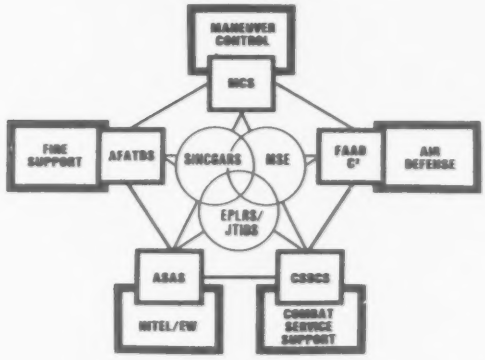
The Army intends to integrate appropriate SDIO technology into TMD programs. The major benefits from SDI will most likely be in technological areas which will come to fruition in the longer-term TMD program.

The FY90/91 request will continue development of PATRIOT PAC-2 and the Multi-Mode Seeker Demonstration with the Federal Republic of Germany.

BATTLEFIELD SYNCHRONIZATION

A flexible, integrated and automated C3 network is needed to provide the battlefield commander with intelligence tools to fight the AirLand Battle. Our C3 mission area has the challenge of keeping pace with the Army's greatly increasing requirement for providing timely information transfer. In all of the five battlefield functional areas, maneuver control, fire support, air defense, intelligence/electronic warfare, and combat service support, information processing and data transfer is limited by manual and partially automated methods. For example, advanced weapon systems have long been in development to support the deep battle concept of the AirLand Battle Doctrine without corresponding C3 upgrades. In the near future; however, we will begin to see our C3 systems rapidly closing the gap.

ARMY COMMAND AND CONTROL SYSTEM (TACTICAL)



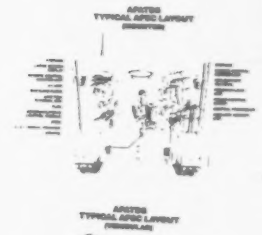
Army Tactical Command and Control System (ATCCS)

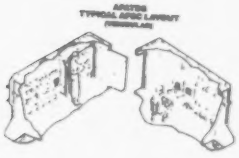
C3 support responds to 5 critical requirements: to rapidly collect and assess intelligence; to tightly control battlefield sensors; to engage specific targets; to effectively support maneuver; and finally, to achieve close coordination of battlefield air interdiction and close air support. The C3 network designed to meet these 5 requirements is the Army Tactical Command and Control System (ATCCS). As ATCCS has evolved, we have for the first time been able to identify and articulate requirements for common hardware and operating system software (CHS). This has been accomplished for computer processing that covers all of the battlefield requirements serviced by ATCCS as shown in this depiction of the 5 battlefield functional areas.

Maneuver Control System (MCS)

Controlling the movements of our forces is accomplished with the Maneuver Control System (MCS). The MCS provides computer aided decision support to tactical commanders and operations personnel at corps through battalion levels. Important battlefield information can be collected and reviewed, with subsequent battle plans, orders, estimates and tactical reports being produced and distributed rapidly. Purchase of the militarized MCS computers was completed in FY87. The Nondevelopmental Items (NDI) were bought out in FY88. The fully militarized device with Ada software language has been fielded to V and VII Corps in Europe, and III Corps at Fort Hood. Fielding of the NDI hardware will begin with III Corps in 2d Qtr FY89. The program is successful and has substantial momentum. The FY90 MCS request provides the funds to continue evolution of software and begin preparation for the transition of the system to use the ATCCS Common Hardware/Software (CHS).

AFATDS





ADVANCED FA TACTICAL DATA SYSTEM

- STATE OF THE ART TOTAL FIRE SUPPORT SYSTEM
- DISTRIBUTED PROCESSING
- USES ARMY COMMON (ATCCS) HARDWARE
- FIRST UNIT EQUIPPED 2D QTR FY 92

The command and control of the Fire Support functional area will be accomplished by AFATDS, a role critical to implementation of AirLand Battle doctrine. The AFATDS will provide fully automated support for the planning, coordination, and execution of close support, counterfire, interdiction and suppression of enemy fires. It will meet fire support requirements of the Army Tactical Command and Control System (ATCCS) during the 1992-2010 timeframe. Compatibility will be provided with all existing and planned U.S. and allied field artillery systems and sensors. The AFATDS will also correct the fire control and data distribution deficiencies of the current TACFIRE system with no increase in personnel requirements, with greatly reduced size, and minimized training burden. The fielding objective of the AFATDS program is to totally field both the Active and Reserve components. A milestone III ASARC will take place for AFATDS in FY89. FY90 activities include continued Full Scale Development of Fire Support software, continued system integration and test with the ATCCS CHS as well as development of installation kits and accessories to support test and initial fielding of AFATDS.

FAAD C2

The Air Defense command and control in the forward area will be performed by the Forward Area Air Defense Command and Control (FAADC2) of the Forward Area Air Defense System (FAADS). The FAADS consists of weapon delivery elements tied together by command, control and intelligence elements which also integrate FAADS with the supported forces. The FAADC2 element incorporates a family of sensors and identification equipment (ground and aerial, active and passive) with an automatic data processing and distribution capability. The FAADC2 will correct serious deficiencies in targeting, air defense operations and force integration. This is achieved through processing and dissemination of aircraft alerting and cueing data from sensors, control orders and other air defense command and control data. Overall system integration, assembly and test will begin in FY91.

The All Source Analysis system (ASAS) is designed to provide field commanders with Intelligence tools necessary to successfully prosecute the Deep Attack. The ASAS program is covered in detail in the Deep Attack section.

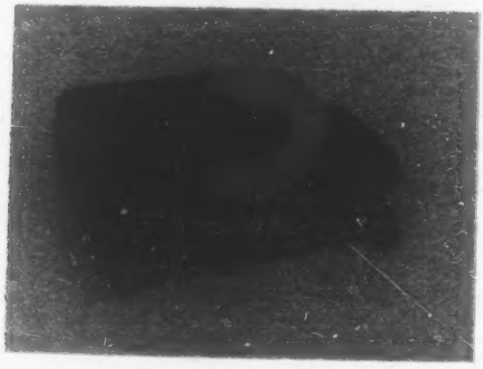
Combat Service Support Control System (CSSCS)

As one of the principal control nodes of the Army Tactical Command and Control System (ATCCS), CSSCS supports the planning and decision making processes of the theater and tactical level commander. CSSCS provides resource management information for the functional areas of logistics, medical, financial and personnel. CSSCS provides an integrating capability for the Combat Service Support (CSS) functional areas and interfaces between ATCCS and the CSS Standard Army Management Information Systems (STAMIS). It provides an essential decision support system to both the force level and CSS commanders. The CSSCS will be deployed at separate brigades and armored cavalry regiments, maneuver and combat aviation brigades, divisions, corps, and echelons above corps. FY89 activities include Milestone I review and initial division level software demonstration at Ft Lewis, WA. An FY90 goal is to award the Objective CSSCS System Development contract.

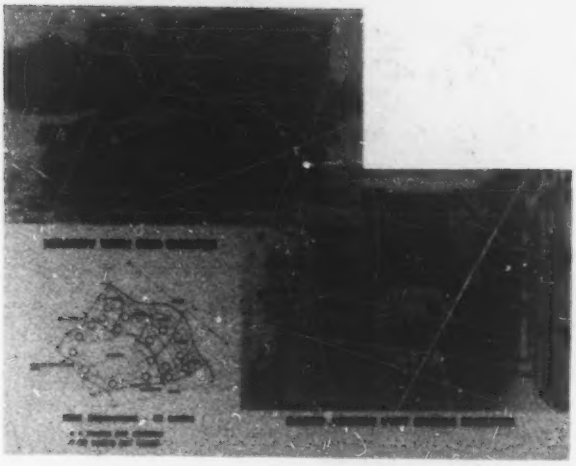
Common Hardware Software (CHS)

The CHS will procure 3 versions of common hardware (handheld, portable, transportable) for the Army Tactical Command and Control System (ATCCS). CHS will be provided to the five Project Managers as building blocks for ATCCS. Emphasis is placed on restricting the number of unique tactical hardware and software systems that are being fielded by the Army in order to minimize cost and maximize continuity of operations. FY89 activities include delivery of CHS to the five Battlefield Functional Area (BFA) Project Managers to conduct their hardware and software system integration, development and testing. Each BFA will use the test results as input to its CHS production decision.

Single Channel Ground and Airborne Radio System (SINCGARS)



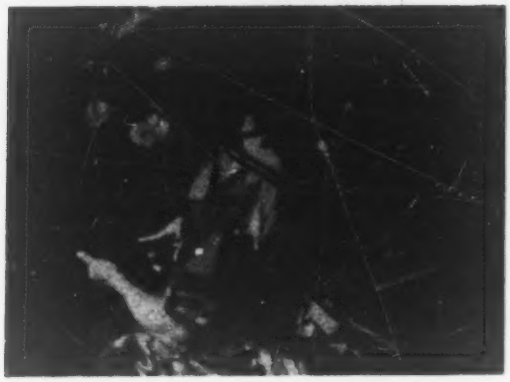
The Single Channel Ground and Airborne Radio System (SINCGARS) will serve as the backbone of the Army combat net radio and provide voice and data communications for tactical command and control. SINCGARS is a family of lightweight, secure VHF/FM radios with greatly improved reliability over the radios which they replace. It can operate in an electronically hostile environment using an antijam technique known as frequency hopping. SINCGARS radios are configured in manpack, vehicular, and airborne versions. A modular approach using a single receiver-transmitter allows SINCGARS to replace five currently fielded radios. A total of 350,582 ground and 14,220 airborne radios will be procured through 2003. A limited fielding to Korea took place in December 1987. Limited Initial fielding to Army units in SOUTHCOM is planned in January 1989. Major unit fielding will begin in FY90.



Mobile Subscriber Equipment (MSE)

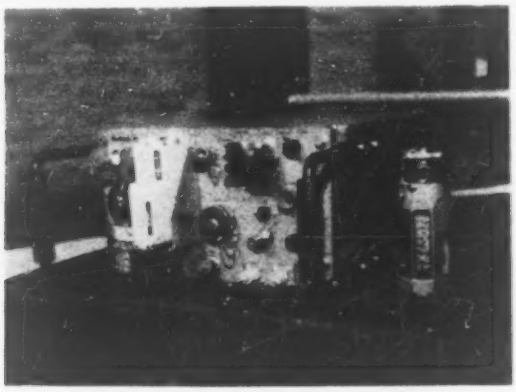
The Mobile Subscriber Equipment (MSE) is a secure, automatic digital area communications system which will provide mobile and stationary users at corps and division level with voice, data, and facsimile capability. The underlying concept of MSE is to better support the Airland Battle area communications provided at corps and below. MSE will be more mobile, less manpower intensive, and more survivable than the existing area communications facilities. The force structure identified in the current MSE contract will be totally equipped by 1994 with equipment that provides multiple communications nodes and network features which automatically bypass and reroute communications around damaged or inoperative nodes. MSE will greatly facilitate operations through its modular signal organization structure, mobility, and quick set-up and displacement capability. The system is interoperable with TRI-TAC equipment, combat net radio, commercial telephone systems, and NATO communications networks.

Procurement from the first four of seven contract awards will equip and field 12 corps signal battalions, 11 division signal battalions with associated MSE division equipment, and the Fort Gordon and Fort Sill training bases. A Follow-On Operational Test and Evaluation was concluded in November 1988.



The Army Data Distribution System (ADDS)

Tactical near real-time data distribution will be performed by the Army Data Distribution system (ADDS). The ADDS will give combat commanders the capability of meeting near real-time data communications and position location reporting requirements. The ADDS consists of two systems, the Enhanced Position Location Reporting System (EPLRS), a joint Army/marine program, and the Joint Tactical Information Distribution System (JTIDS), a tri-service program. The ADDS system will support data communications requirements in the five functional areas of air defense, intelligence/electronic warfare, fire support, maneuver control and combat service support.



JTIDS Class 2 Terminal

The EPLRS portion of the ADDS program will complete Technical Testing and the final phase of Low Rate Initial Production will begin in April 1989. During FY90 R&D efforts will be directed toward Very High Speed Integrated Circuit (VHSIC) technology insertion and Net Control Station (NCS) downsizing. The JTIDS program will continue with Class 2M Terminal and NCS development through FY90. Following completion of comprehensive testing of the ADDS, FY91 funding will initiate full scale production.

Army's Satellite Communications Program consists of the Ground Environment of the Defense Satellite Communications System (DSCS) and the Ground Mobile Force Tactical Satellite Communication Program.

The global Defense Satellite Communications System (DSCS) satisfies unique and vital command, control, and intelligence communications requirements that have been validated by the JCS.

Defense Satellite Communications System (DSCS)

The Army is the Executive Agent for the Ground Sub-System of DSCS. In FY89 a developmental contract was awarded for the DSCS Generic Principles Trainer (GPT), which will greatly enhance the US Army Signal School capability to train DSCS operators.

FY90 R&D efforts will apply new technology to enhance the reliability and efficiency of the system, continuation of the GPT development and continuing upgrades to the DSCS Integrated Test Facility at Ft Monmouth, NJ. FY90 procurement efforts are directed toward modernization projects which will sustain the availability of the worldwide system into the 21st century.

Single Channel Objective Tactical Terminal (SCOTT)

Full Scale Development is underway to provide the highly survivable, anti-jam and mobile ground terminal—the Single Channel Objective Tactical Terminal (SCOTT)—for the MILSTAR Satellite Communications System. SCOTT will operate and survive in a severe electronic warfare, nuclear, chemical and biological environment in which ground relay networks dependent upon the use of prominent terrain may be largely disrupted. Such a capability will support critical communications required by the joint, tactical and non-strategic nuclear force commanders. The MILSTAR/SCOTT system provides an enduring communications link on the battlefield in both intense jamming and nuclear environments.

The Army's FY90 program will continue development of critical pre-planned improvements to the baseline terminal design and the training simulator. Procurement funds will be used to initiate SCOTT production based on successful completion of development and operational tests in FY89.

TECHNOLOGY BASE

Technology has changed every area of today's modern battlefield. It has, for example, improved firepower, and mobility, target acquisition, battlefield survivability and medical care. Improvements in such technologies as electronics and night vision have greatly increased the individual soldier's sphere of battlefield influence. Other by-products of this technological change include increased information flow during continuous operations over an extended, integrated, highly lethal battlefield. The Army considers the technology base an indispensable "Corporate Investment" to ensure continued technological superiority of our forces.

The Army's technology base program is dedicated to identifying, maturing and transitioning technologies to achieve our vision of the future Army. The Basic Research (6.1) program exploits science, identifies technological opportunities and maintains a vital link with university and industry research. Our exploratory development (6.2) program evaluates the technical feasibility of advanced concepts and technologies leading to improved warfighting capabilities. Army non-system specific advanced development (6.3A) efforts speed the transition of technology by conducting demonstrations of advanced technology components, subsystems and systems so that we evaluate technical risk and operational promise prior to full scale development. A critical component of the Army's technology base investment strategy is to set the minimum sustained funding for 6.1 and 6.2 programs at 0% real growth beginning in FY90 and pursue a total technology base program (6.1 and 6.2 and 6.3A) goal of 2% of Army Total Obligation Authority (TOA).

This year the Army has taken important initiatives to focus and strengthen the technology base to increase its quality and contribution to future warfighting capability. Our Technology Base Investment Strategy is documented in the Army Technology Base Master Plan (ATBM), which provides top-down guidance and focus to Army Research and Development activities. Major elements include:

oo Meet near, mid and far term warfighting needs.

oo Reduce the lead-time for introducing new technology into our weapons systems.

oo Retain our leadership in high technology.

oo Identify and exploit key emerging technologies.

oo Leverage other Service, other Government agency, industry, academia and international investment.

oo Balance resources among future systems, supporting capabilities, systemic problems and key emerging technologies.

Army modernization must never stop if we are to stay ahead of the threat. Our modernization strategy and plans balance procurement and R&D within budget realities. The Army Aviation Modernization Plan was our first modernization plan followed by the Heavy Force Modernization Plan with others in preparation. The Army Technology Base Master Plan is linked to these plans. A key feature of these plans is that we modernize inside the threat's research, development and acquisition cycle while also keeping our technological options open during the

R&D process. One key to success is our ability to reduce the lead time needed to introduce new technology into our weapon systems. To this end the Army has focused a significant portion of its 6.3A program on Advanced Technology Transition Demonstrators (ATTD). The Army has a successful track record with such technology demonstrators as evidenced by: Fiber Optic Guided Missile (FOG-M); Advanced Technology Demonstrator Engine (ATDE) which led to the T-800 Engine; and Advanced Composite Airframe Program (ACAP) which demonstrated the composite airframe technology for the LHX.

LHX ♦ ADVANCED TECHNOLOGY CONTRIBUTION
ADVANCED TECHNOLOGIES APPLIED
• Advanced Rotor Design
• Advanced Composite Structures
• Fly-By-Wire/Light Flight Control System
• Drag Reduction
• T800 Engine
• Advanced Mission Equipment
• Integrated/Automated Cockpit
PROJECTED LHX IMPROVEMENTS vs BLACK HAWK/APACHE TECHNOLOGY
• Less Engine Power Required
• Lighter Empty Weight
• Less Mission Fuel Required
• Improvement in Payload/GW Ratios
• Lighter Design Gross Weight

Some of our current ATTDs are listed below:

o Advanced Combat Vehicle - Integrates and demonstrates advanced technologies critical to future tank and other heavy force armored vehicle designs. It includes: advanced gun, fire control and autoloader; advanced integrated propulsion system; hydropneumatics suspension; advanced lightweight track; vehicle electronics and integrated survivability technologies.

o Advanced Field Artillery System - Demonstrates liquid propellant and unicharge gun technologies; advanced gun mount; advanced fire control; and automated ammunition handling.

o Combat Vehicle Command and Control (CVC2) - Demonstrates technologies for automating the "Cockpit" of ground combat vehicles and the networking of vehicles at the individual vehicle, platoon, company and battalion echelons. CVC2 technologies promise to leverage existing vehicle capabilities for modest investment.

o AirLand Battle Management (ALBM) - Uses artificial intelligence techniques for automating the planning and course of action generation functions in the Army Command and Control system. ALBM will provide the battlefield commander with the decisive edge in formulating battle plans and exploits our technological strength in artificial intelligence.

o Air-to-Air Mission Equipment Package/Weapons Demonstrator (AAMMD) - Integrates weapon and mission equipment package advanced technologies to provide armored rotorcraft air-to-air superiority while maintaining outstanding air-to-ground capability.

o Day/Night Adverse Weather Pilotage (D/NAPS) - Enhances mission availability, effectiveness, and survivability by providing adverse weather operation through innovative integration of advanced sensors, computing methods, controls, and displays.

o Integrated High Performance Turbine Engine Technology (IHPTET) - A tri-service program, with the objective of providing advanced propulsion technology options for 21st century Army, Navy and Air Force aircraft propulsion needs.

o Stand-off Mine Detection - Remote detection of minefields has a high priority to counter the mine threat posed by Warsaw pact forces. Standoff detection enables better organization, synchronization, and utilization of resources to counter the mine threat as well as increasing survivability.

o Aided Target Recognition (AIR) - Demonstrates the economical fusion of multiple sensor and processor modules in an automated target acquisition suite and pursues commonality between future air and ground applications.

The Army's Technology Base Investment Strategy also emphasizes the pursuit of a set of key emerging technologies offering high pay-off in warfighting capability. These technologies are:

Protection Lethality
Artificial Intelligence
Robotics
Directed Energy
Micro-Electronics/Photonics/Acoustic Devices
Advanced Materials/Material Processing
Advanced Signal Processing and Computing
Advanced Propulsion
Power Generation/Storage/Conditioning
Space Technology
Low Observables
Biotechnology

In an age of increasing technological opportunities and constrained resources, leveraging of the Army's technology base efforts is a necessity.

Approximately one fourth of the technology base is dedicated to tri-service or DoD commitments for which the Army is the sole financial contributor. An example of this is the development of small arms, 40MM and below. Also, the Army is the principal contributor of technology base work for rotorcraft technology for DoD. In addition, much of the Army's technology base funding is linked to joint funding agreements with NATO and other friendly nations, to other services in areas such as crew member-machine interface, and to joint programs with the Defense Advanced Research Projects Agency (DARPA).

In addition to joint service programs and cooperative agreements with other services and agencies, the Army is increasingly relying upon industry and academia as a means of increasing its return on investment. A number of mechanisms and programs are available to increase sharing efforts with industry, such as the Small Business Innovative Research (SBIR) and industry IR&D programs. With respect to academia, Army support often yields more than the results of individual research efforts. In many instances it leads to well-supported long-term commitments that provide the Army with the educational assets needed to train both its civilian and military technical personnel of the future. The University Research Initiative (URI) and Army "Centers of Excellence" are valuable sources of information and perspective that are critical to planning long-term technological thrusts.

The underlying strength of the Army's technology base rests in its people and their creativeness. With proper consistent top-down guidance, and a stable program, the professionals who make up the Army's technology base team will ensure our Army maintains its qualitative edge.

BINARY CHEMICAL WEAPONS MODERNIZATION AND NUCLEAR, BIOLOGICAL AND CHEMICAL (NBC) DEFENSE

Binary chemical weapons modernization and NBC defense impacts across the entire spectrum of the battlefield. The Army's defense posture and recent improvements in our total military readiness could be jeopardized by a single factor - the lack of a credible chemical deterrent.

Our policy with respect to chemical warfare is based on three principles. First, we renounce the first use of chemical weapons. Second, we are continuing to attempt to negotiate a comprehensive, verifiable treaty to ban weapons. Finally, in the absence of a ban on chemical weapons, our program is formulated to deter use by convincing an adversary that his forces will suffer unacceptable consequences if he initiates chemical warfare. To implement this program, we must continue to support a strong chemical deterrent which consists of a credible retaliatory capability and an adequate NBC defense capability.

While continuing to seek a verifiable worldwide ban of chemical weapons, we recognize the current need to maintain the capability for a credible deterrent as an Arms Control position of strength. We have a paramount need to modernize our chemical retaliatory capability. The current stockpile is old and the majority of agent is in bulk storage and of no use.

Binary Chemical Weapons Modernization

The modernization program provides three types of binary munitions: binary chemical warhead for the Multiple Launch Rocket System (BCW MLRS); M687 155MM GB-2 projectile; and the BIGEYE bomb (to be fielded by the Air Force and Navy in the early 1990's). The binary concept is a process by which a lethal chemical agent is formed from nonlethal components by means of a chemical reaction during flight of the weapon to a target. Significant advantages over current conventional chemical munitions are achieved in safety, transportation, production, storage, handling and final disposal.

The 155mm GB-2 projectile will provide a nonpersistent nerve agent to influence the close battle. The BCW MLRS, with a semipersistent agent, will provide an intermediate range retaliatory capability beyond the 155mm range. The agent in the BCW MLRS produces both a liquid and vapor hazard on the target that can last for several hours.

Nuclear, Biological and Chemical (NBC) Defense

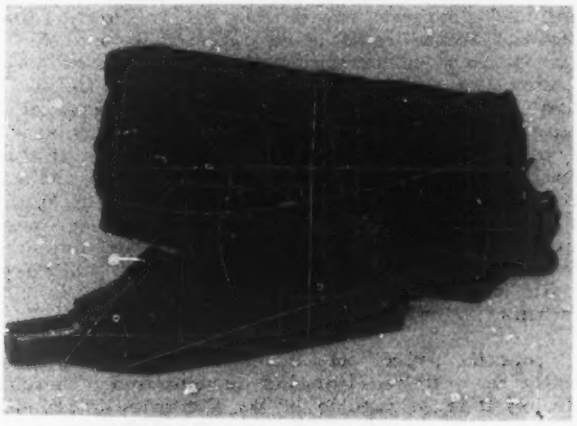
The NBC defense program is a key element of a credible deterrent. The program supports the fundamentals of NBC defense doctrine: contamination avoidance, protection, and decontamination. In the 1990's we begin to procure key NBC systems. The NBC reconnaissance system (NBCRS) will fill the urgent operational need to execute contamination avoidance throughout the depth of the battlefield.

New protective masks and lightweight protective garments being fielded in the 1990's will reduce the burden of operating in a contaminated environment. A collective protection system for corps hospitals will provide protection from contamination and allow medical personnel to care for casualties in a safe environment.

Decontamination capability is seriously lacking. The 1990's will produce new and more effective decontamination equipment that will reduce the current time consuming and labor intensive process. Key equipment includes the M17 lightweight decon system and a non-aqueous equipment decon system.

M40 Protective Mask

The M40 Protective Mask is an individual respiratory protection device that shields face, eyes, and lungs from field concentrations of chemical/biological agents, riot control agents, toxins, and smoke. The M40 is designed to replace the M9 and M17 series protective masks. Basis of issue of the mask is one per individual soldier. Fielding will occur during FY89 with priority of issue being to units with a peacetime chemical handling mission. The filter canister is NATO compatible, rapidly replaceable and can be mounted on either side of the mask as desired by the wearer. The mask affords better protection and is more comfortable than the M17 series mask.



Chemical Agent Monitor (CAM)

The Chemical Agent Monitor (CAM) is a hand-held, soldier operated device for monitoring chemical agent contamination on personnel and equipment. The monitor will detect and display the relative concentrations of contamination of either nerve or blister agent. The CAM is not a replacement for the currently fielded M8A1 Chemical Agent Alarm, rather it is strictly a post attack survey/monitor instrument. The CAM can be used to determine when chemical protective clothing can be removed, what supplies and equipment present a chemical hazard, the effectiveness of decontamination, where clean areas are, the contamination/cleanliness status of casualties entering medical treatment facilities, and whether collective protection enclosures have been breached by chemical agents. When the CAM detects the presence of a chemical agent vapor, a visual display will indicate the type and the relative concentration of agent. The CAM will be fielded in late FY89. Distribution is two per company or equivalent sized unit (plus special distribution for chemical and medical units).

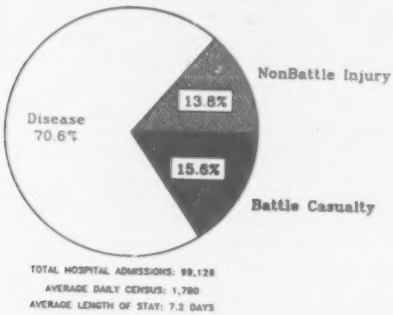
MEDICAL RESEARCH

The soldier is the most vulnerable and critical component in the array of battlefield "systems." The Army medical research and development program is geared to address performance degradation factors that could make this human system inoperable or cause it to operate at reduced efficiency due to physical, psychological, or disease-related stresses in a variety of climates and hostile environments, both in peacetime and during periods of conflict.

Chemical weapons continue to represent a major threat against U.S. forces. Recent events have dramatically demonstrated that warring nations will use every weapon in their inventories, including chemical weapons, to persevere in a conflict. During FY90 a resin-based skin decontaminating kit (SDK) will be fielded. Unlike the previous generation skin decontamination kit, the new resin-based SDK is non toxic, non-irritating and is effective against multiple threat agents. Because the SDK is non-corrosive, it can be used in training and familiarization by U.S. forces so confidence can be assured. Also in FY90, a Medical Aerosolized Nerve Agent Antidote (MANAA) will be fielded. This is an aerosolized formulation of atropine which will be issued to medical personnel to treat nerve agent casualties as a follow-on to the autoinjector. The MANAA contains the equivalent of 40, 2-milligram autoinjectors of atropine which significantly decreases the logistical burden of providing sufficient atropine far forward to adequately manage nerve agent casualties. In FY90, the Medical Chemical Defense ROTE program will transition a new, broad spectrum pretreatment/antidote for nerve agent poisoning from Tech Base to development. Furthermore, information that has been collected using performance assessment methods will be available to provide an added level of accuracy to doctrine and the operations of combat aviators.

The potential numbers of biological threat agents has increased exponentially due to the recent advances in biotechnology. Through recombinant DNA technology it is now possible for our adversaries to isolate, chemically define and synthesize biotoxins which are highly potent but which exist only in nature in minute quantities. These include such substances as marine toxins or snake venoms. In addition, recombinant DNA technology may be used to alter microorganisms so as to enhance their suitability as biological warfare agents. To address this increasing threat, the medical biological defense program has been reevaluated to emphasize new approaches to the increasing threat. A safe, effective vaccine that will protect against Rift Valley Fever Virus, an acute febrile illness of Sub-Sahara Africa which can jeopardize the mission by temporarily incapacitating or occasionally causing death, will be fielded in FY90. This vaccine will protect against both the natural transmission and threat biological warfare use of this virus. Recently, a contract was signed to make an Anthrax vaccine available by FY91 for contingency forces. Microencapsulation technology will be used to develop/evaluate organ and tissue specific vaccines and drug delivery systems to protect U.S. forces.

COMPARISON OF CAUSES OF ADMISSIONS OF
ACTIVE-DUTY PATIENTS (VIETNAM 1969)



Naturally occurring infectious diseases caused more hospital admissions in U.S. forces during World War II, Korea and Vietnam than battle and nonbattle injuries combined. This includes such diseases as malaria, dysentery and dengue. A number of significant developments related to the diagnosis, prevention and treatment of these diseases have recently been made by U.S. military scientists. In FY90 an antiviral drug, Ribavirin, will be fielded to treat life threatening viral diseases such as the hemorrhagic fevers. To date no other therapeutic products exist for this group of viruses which are endemic in areas of strategic interest. Also in FY90, a vaccine against Japanese Encephalitis Virus will be fielded. This vaccine has already been used under approved human use protocols to protect U.S. forces during field exercises in Thailand and Korea. A new generation, topical insect/arthropod repellent will be fielded. This repellent provides a user acceptable, operationally practical product that protects U.S. forces against bites from insects/arthropods for up to twelve hours with a single application, thus reducing casualties from insect-transmitted diseases. Furthermore, the U.S. Army Medical Research and Development Command executes the Congressionally mandated, DoD directed Acquired Immune Deficiency Syndrome (AIDS) RDTE program which was established to resolve militarily unique questions concerning manning, mobilization and deployment of U.S. forces.

The intensity of combat and the resulting increased casualty rates in the future will exceed comprehension. The ability to stabilize, evacuate and treat injured personnel will tax the medical and logistical assets of the services. To this end, research is ongoing in several areas to reduce the morbidity and mortality from these causes. In FY90, a new resuscitative fluid, Hypertonic Saline Dextran (HSD) will be fielded. This innovative product will have broad implications on the battlefield in the stabilization and treatment of hemorrhagic shock casualties. Hypertonic Saline Dextran resuscitation provides a more realistic treatment in that it requires only one-twelfth of the previously required volume/weight of fluid (e.g. a reduction of 6.6 pounds) and stabilizes the casualty victim for six to eight hours (an important factor when evacuation is delayed). The development of stroma free hemoglobin and battlefield filmless imaging will continue. Stroma free

hemoglobin when fielded will provided an alternative to whole blood requirements (collection and storage) in a combat scenario. Battlefield filmless imaging will improve and expedite the radiological processes required in casualty care. These products, like HSD, will also reduce the logistical burden for medical supplies and enhance the survival capabilities for U.S. forces. Medical research also includes the development of synthetic, biodegradable implant materials to replace missing facial bone segments that will also accelerate wound healing and simplify final surgical reconstruction.

Many of the normal, daily hazards impacting on the soldier come from sources such as blast overpressure from artillery, combustion fumes from explosions, and radiation from laser, microwave, and radar systems. Army medical research addresses these occupational hazards as well as environmental hazards. Medical research is directed to study the stresses affecting the soldier-operator that are produced by materiel systems, battlefield environments, and environmental extremes. In Combat Health Hazards Assessments RDTE, a study in Training Injury Prevention Strategies will be completed in FY90. Results from this study will be used to make recommendation to U.S Army Training and Doctrine Command on the means by which the incidence of training-induced stress fractures may be reduced without significant impact on conditioning of military personnel. Other accomplishments include the Soldier Safety Monitor System which allows for monitoring up to fifty subjects per system during field exercises; the completion of the non-fragment injury assessment criteria for the Army's Live Fire Testing Program; and the effects of using Remotely Piloted Vehicles for aerial spraying to suppress disease vectoring populations. Emerging technologies in Health Hazards Assessments include Ocular Protection for Wavelength Agile Lasers, a Bioeffects Data Base for the Free Electron Laser, efforts in Downsizing and Lightening the Force while increasing the capabilities and versatility of all medical materiel, and the Utilization of Artificial Intelligence Concepts in the Battalion Aid Station.

Efforts continue to be directed to enhancing the transportability of medical materiel through reduction of weight and size. Combat medical materiel items being developed to reduce the logistical burden and enhance survivability and return to duty include field production of oxygen and medical grade (intravenous) water, a field medical refrigerator, and a heated patient liner for the transportation of casualties in cold environments.

ARMY RDA SPACE ACTIVITIES

Space has become a fourth dimension for national defense along with land, air and sea. The Army continues to support the long-standing direct receipt of National capabilities to the tactical forces. Space activities offer real time capabilities to see as deep as necessary to help the commander in the deep attack of enemy forces. The Army's space commitment is highlighted by the Army Space Command becoming our newest command in April 1988. This commitment has challenged the Army to pool the appropriate human, material and financial resources in order to create a growing cadre of space experts and to develop space systems that support Army mission requirements. Efforts to consolidate most of the Army space RDA in a single space integration project (in PE 63306A) within the R&D community beginning in FY90 further highlights our commitment. The consolidation of space R&D will give continuity to the Army's space effort and eliminate any duplication of effort. The Strategic Defense Command programs, which account for approximately one-third of the overall Strategic Defense Initiative budget, is covered in the last section of this statement.

GROUND BASED ASAT SYSTEM

Anti-Satellite (ASAT) weapons and their command and control elements constitute the space forces necessary to execute space control operations. The objective of the Ground Based Anti-Satellite (ASAT) Systems is to ensure access to space. During the next year the Army will establish a Joint Program Office (JPO) for the kinetic energy weapon system. The Navy will provide a Deputy Program Manager. Options for sea and/or land-based versions will be presented to the Defense Acquisition Board at Milestone I for a final concept selection. An initial Cost and Operational Effectiveness Analysis, and a Test and Evaluation Master Plan will be developed along with a life cycle cost estimate for both the kinetic energy weapons system and the surveillance and Battle Management, Command, Control and Communication (BM/C3) portion of the program.

STRATEGIC DEFENSE

Strategic Defense

The Army has been conducting research and development aimed at increasing the capabilities and effectiveness of strategic defense systems for over 30 years. This effort was conducted by evolving Ballistic Missile Defense (BMD) organizations which created an extensive technology base. Thus, when President Reagan called for creation of a defense against nuclear-armed ballistic missiles, the Army was able to lend extensive support to the Strategic Defense Initiative (SDI) by providing ongoing research and early demonstrations of BMD technology. The efforts of the US Army Strategic Defense Command (USASDC) in support of SDIO can be categorized into the five key areas of strategic defense:

o Surveillance, Acquisition, Tracking, and Kill Assessment include radars such as the Ground based Radar (GBR), to provide tracking and identification of incoming enemy warheads. Other projects include a rocket-borne sensor probe, known as the Ground Based Surveillance and Tracking System (GSTS), to provide early warning and tracking, and the Airborne Optical Adjunct (AOA), a testbed for optical and laser tracking technologies.

o Directed Energy Weapons programs explore exotic technologies, such as the Ground Based Laser (GBL), which will demonstrate the feasibility of using lasers to attack hostile objects in space. Other beam devices, such as the Neutral Particle Beam (NPB), hold the promise of being able to distinguish enemy warheads from decoys and other debris through interactive discrimination.

o Kinetic Energy Weapons, which utilize hit to kill technologies, have the ability to acquire, track, and intercept high speed targets. The High Endoatmospheric Interceptor (HEDI) is a high velocity interceptor which will destroy reentry vehicles within the atmosphere, while the Exoatmospheric Reentry-Vehicle Interceptor Subsystem (ERIS) program is designed to intercept enemy weapons outside the atmosphere. Both use non-nuclear kill technology. Advanced research is also ongoing in hypervelocity weapons which use electrothermal and electromagnetic energy to propel projectiles at very high velocities.

o Systems Analysis/Battle Management provides control of the complex, multilayered defense system. The Army is focusing on mid-course and terminal phases of hostile missile flight, and for both continental and theater defense modes. Experiments are being conducted to validate, through simulation, prototype software to collect the necessary sensor data, make timely decisions, and pass instructions to the weapon systems.

o Survivability, Lethality, and Key Technologies investigate methods for enhancing survivability, reducing uncertainties of lethality and vulnerability, evaluating Soviet countermeasures, and developing materials to support system concepts.

Recent program successes have led the Defense Acquisition Board to approve the start of demonstration and validation for a first phase of a strategic defense system. The Army systems included in this initial phase are the ERIS interceptor, the ground-based radar (GBR), the Ground-Based Surveillance and Tracking System (GSTS) sensor probe and the ground portion of the battle management. A full scale development decision is expected by mid-1990.

"Spin-offs" from technology advancements in strategic systems offer the potential to revolutionize tactical capabilities. For example, USASDC is exploiting technologies which can be utilized for Theater Missile Defense (TMD). This is a result of Presidential guidance to expand research on technologies for a defense against ballistic missiles of all ranges that threaten the United States and our allies. Consistent with this guidance, the Army is examining architectures, concepts and systems for theater missile defense against short and medium range ballistic missiles.

TMD concept definition and architecture studies are being conducted through cooperative agreements with our allies. These studies include definition of system specifications as well as operational and organizational concepts to include an analysis of the post-INF (Intermediate Nuclear Forces) treaty environment.

The Extended Air Defense Test Bed (EADTB) is an Army program that will provide the facilities, hardware, and software necessary to conduct simulations and to support analyses of TMD issues. The EADTB concept features testbed nodes at each of several participating locations both in Europe and in CONUS.

The Army is also conducting extensive research into systems capable of providing active defense against the TMD threat. The Extended Range Interceptor (ERINT-1) program will develop and demonstrate a prototype missile and fire control system. In addition, the Army in conjunction with SDIO has entered into an agreement to develop and demonstrate Israeli ARROW missile technology against surrogate TMD targets. The Invite, Show, and Test (IST) program will evaluate and test US and Allied systems, subsystems and components in order to identify available technologies which may contribute to TMD. Eight IST contracts have been awarded (two each in seekers, radars, sensors, and interceptors).

An additional integral part of the US Army Strategic Defense Command mission is the management of US Army Kwajalein Atoll (USAKA) as a National range for strategic defensive and offensive systems for all services.

Through all of these research and development efforts the Army continues to fulfill a vital role in the development of an effective missile defense for the United States and our allies.

SOLDIER SUPPORT AND SURVIVABILITY

Soldier Support and Survivability encompasses the development of, and application of technology designed specifically to improve the battlefield efficiency of our soldiers. Development efforts include new food items and food service equipment that meet high nutrition requirements while reducing the numbers of food service personnel, food procurement costs, and total food logistics support requirements. Individual clothing and equipment items lighten the individual soldier's load and provide improved protection against environmental extremes, nuclear, chemical, biological agents, and ballistic/laser hazards.

Currently there are 30 clothing and individual equipment R&D projects ongoing which have been approved by the Chief of Staff, Army. Projects include laser/ballistic eye protection, self contained chemical uniform flechette ballistic vest, aircrew battledress uniform, aircrew cold weather uniform, snow and ice traversing equipment, and equipment airdrop containers. Also, 34 product improvements to fielded items are being worked. These include improved aircrew/CVC cooling vest, light duty leather glove, vapor barrier boot, extra large PASGT helmet, chemical/biological glove, combat boot sock, and vet weather parka/trousers.

During 1989, 11 items are expected to be approved and type classified. These will include the 40MM grenade vest aircrew NBC uniform, extreme cold weather canteen, aircrew flight uniform, interim self contained chemical uniform, enhanced SPH4 aviator helmet, gross chemical liquid protection overgarment, laser/ballistic eye protection, aviator survival vest, snow/ice traversing equipment and sleeping bag pad.

TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT

The TMDE systems provide equipment, state-of-the-art technologies, and support for the testing and diagnostics, of major fielded weapon systems, e.g., Hawk, Multiple Launch Rocket System (MLRS), AH-64 Apache, CH-47D Chinook, Joint Tactical Fusion, Forward Area Air Defense System (FAAD), Abrams tank and the Bradley Fighting Vehicle. The introduction of new TMDE and sustainment of current TMDE is essential for the success of the Army's Force Modernization Program and critical for the readiness and sustainment of presently fielded weapons systems.

The FY90 funds will continue the procurement and development of test measurement equipment, calibration standards hardware, accessories, intermediate forward test equipment (IFTE), Commercially Equivalent Equipment (CEE), Contact Test Set (CTS), and other automatic test equipment (ATE). The first option to the low rate initial production (LRIP) for IFTE will be awarded during the 1st Qtr, FY90.

IFTE BASE SHOP TEST STATION (HAWK)

CONCLUSION

The FY90 budget request represents a balanced program to equip the Army. Our broad-based modernization program, the greatest in peacetime history, is allowing us to provide our soldiers with the quality equipment they need to maintain deterrence and prevail in case of war. As the Chief of Staff of the Army has noted, there is no substitute for the presence of forces on the ground as our nation's clearest symbol of resolve.

We must buy and allocate our new equipment with sound business sense and optimum military rationale. Our major concern is that further reductions and economic instability will erode our ability to achieve that goal. It is a business axiom that it is futile to try to merely catch up to a competitor—you must leap ahead. Our present major procurement programs have achieved this quantum jump in performance capability. As our Army prepares to move into the next decade, our RDA goal is to continue that trend. The main determinant in our ability to achieve a successful transition into the 1990's is adequate and stable funding. Accordingly, we need the continuing strong support of Congress.

FY90 BUDGET

AIRCRAFT PROCUREMENT, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
	AIRCRAFT			
FIXED WING				
A11500	GRISLY HUNTER	0.0	9.9	9.9
A02005	RC-12H/K RECON AIRPLANE	67.4	52.7	106.7
ROTARY WING				
A03407	MH-60K (SOF AIRCRAFT)	0.0	71.3	68.5
AA0007	AH-64 ATTACK HELICOPTER (APACHE)	856.1	736.1	688.9
A0007	AH-64 ATTACK HELICOPTER (ADV PROC)	76.0	90.0	80.0
AA0005	UH-60A BLACK HAWK (MYP)	225.1	206.1	221.6
AA0005	UH-60A BLACK HAWK (MYP) ADV PROC	205.6	180.3	191.0
	MODIFICATION			
AZ3530	OV-1 MOHAWK SURVEILLANCE AIRPLANE	6.2	15.2	36.9
AZ3530	OV-1 MOHAWK SURVEILLANCE AIRPLANE (AP)	0.0	0.0	0.0
AZ2000	RC-12D UPGRADE	31.9	43.1	34.3
AZ2900	AIRPLANES, RECON, RU-21	7.5	1.5	9.8
AA0150	AH-1S ATTACK HELICOPTER (COBRA-TOW)	29.3	5.9	4.4
AA6605	AH-64 MODS	6.3	38.1	77.1
AA0250	CH-47 CARGO HELICOPTER MODS (MYP)	161.9	200.2	194.9
AA0250	CH-47 CARGO HELICOPTER MODS (AP)	84.4	104.3	48.9
AA0400	OH-58 OBSERVATION HELICOPTER (KIOWA)	17.4	28.2	26.1
AA0600	UH-1 UTILITY HELICOPTER (IROQUOIS)	0.0	9.6	24.0
AA0490	UH-60 BLACKHAWK MODS	23.4	41.0	69.0
AZ2200	ARMY HELO IMPROVEMENT PROGRAM (AHIP)	168.6	241.1	267.8
AZ2200	ARMY HELO IMP PGM (AHIP) ADV PROC	34.0	35.3	36.5
AA0700	AIRBORNE AVIONICS	2.7	0.0	0.0
AA0720	ASE MODIFICATIONS CLOSE COMBAT	25.0	7.1	12.9
AZ3405	ACFT 9WW	24.0	19.7	18.6
AZ3407	SOF AIRCRAFT MODIFICATIONS	70.5	212.5	317.0
AZ3407	SOF AIRCRAFT MODIFICATIONS (AP-CY)	50.0	127.4	0.0
	SPARES AND REPAIR PARTS			
AA0950	SPARE PARTS (AA0950)	552.2	576.1	564.9
	SUPPORT EQUIPMENT AND FACILITIES			
AZ3504	AIRCRAFT SURVIVABILITY EQUIPMENT	65.8	98.8	109.2
AZ3000	AVIONICS SUPPORT EQUIPMENT	24.2	23.8	25.1
AZ3100	COMMON GROUND EQUIPMENT	32.3	46.3	75.8
AA0050	AIR TRAFFIC CONTROL	0.0	7.8	8.3
AZ3300	INDUSTRIAL FACILITIES	21.0	23.0	26.5
AZ3800	SYNTHETIC FLIGHT TRAINING SYSTEMS	0.0	10.0	9.9
AZ5800	AVIATION NON SYSTEM TRAINING DEVICES	0.0	0.0	7.5
A50100	WAR CONSUMABLES	3.1	4.3	4.4
	TOTAL AIRCRAFT APPROPRIATION	2871.8	3267.5	3377.3

FY90 MISSILE PROCUREMENT, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
	OTHER MISSILES			
	SURFACE-TO-AIR MISSILE SYSTEM			
C22100	CHAPARRAL	56.7	30.8	25.7
H03100	NON-LINE OFSIGHT MSL (AP)(CY)	0.0	32.5	54.3
H01700	ADS HVY MSL SYSTEM (CURRENT YEAR)	84.7	351.6	338.1
H01700	ADS HVY MSL SYSTEM (AP-CY)	23.8	51.6	54.8
C25400	HAWK MISSILE (MYP)	0.0	55.4	48.5
CA0275	OTHER MISSLE SUPPORT	4.5	1.0	4.7
C49100	PATRIOT (MYP)	777.6	924.5	859.9
C49100	PATRIOT (MYP) ADV PROC	37.4	0.0	0.0
C18500	STINGER (MYP)	241.3	187.5	258.8
C18500	STINGER (MYP) ADV PROC	0.0	0.0	21.3
C16000	LINE OF SIGHT REAR FIRE UNIT (LOS-R)	91.8	115.8	110.1
C16000	LINE OF SIGHT REAR FIRE UNIT(LOS-R) (AD)(CY)	25.7		
	AIR-TO-SURFACE MISSILE SYSTEM			
C70000	LASER HELLFIRE SYSTEM	204.7	138.3	137.9
	ANTI-TANK/ASSAULT MISSILE SYSTEM			
C59300	TOW 2 SUMMARY	143.1	114.7	168.7
C67600	MULTIPLE LAUNCH ROCKET SYSTEM (MYP)	399.9	251.4	250.1
C67600	MULTIPLE LAUNCH ROCKET SYSTEM ADV PRO	20.8	63.4	66.0
C98510	ARMY TACTICAL MISSILE SYSTEM	66.4	133.3	184.0
C98510	ARMY TACTICAL MISSILE SYS (ADV PROC)	4.3	7.6	4.9
	MODIFICATIONS			
C50700	PATRIOT MODS	40.2	19.4	18.4
C24200	CHAPARRAL MODS	8.1	0.0	0.0
C35200	HAWK MODS	27.6	28.8	32.8
C61700	TOW MODS	33.8	59.3	54.3
C57300	DRAGON MODS	17.3	0.0	0.0
C76200	LANCE MODIFICATIONS	15.4	0.0	0.0
C92800	PERSHING MODIFICATIONS	1.0	0.0	0.0
CE8000	TRACTOR RIG	0.0	2.6	7.8
C67500	MLRS MODS	32.9	28.6	27.3
C54000	AN/TSQ-73 MODS	1.3	0.0	0.0
	SPARES AND REPAIR PARTS			
CA0250	SPARES AND REPAIR PARTS	224.4	263.9	147.8

FY90 MISSILE PROCUREMENT, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
	SUPPORT EQUIPMENT AND FACILITIES			
C93000	AIR DEFENSE TARGETS	21.9	33.3	33.1
CL2000	ITEMS LESS THAN $2.0M (MISSILES)	2.1	2.2	3.0
CA0100	PRODUCTION BASE SUPPORT	9.0	10.6	6.9
	TOTAL SUPPORT EQUIPMENT AND FACILITIES	33.1	46.1	43.0
	TOTAL MISSILE PROCUREMENT, ARMY	2592.0	2907.9	3032.6

FY90 PROCUREMENT WEAPON TRACKED COMBAT VEHICLES, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
	TRACKED COMBAT VEHICLES			
	TRACKED COMBAT VEHICLES			
G80702	BRADLEY FIGHTING VEHICLES (MYP)	644.1	576.4	648.3
G80702	BRADLEY FIGHTING VEH (MYP) ADV PROC	33.0	29.5	38.9
G20900	BRADLEY (BFVS) TRAINING DEVICES	0.0	12.3	0.0
GZ2500	BRADLEY (BFVS) TRAINING DEVICES (MOD)	1.0	0.0	0.0
G82500	REC VEHICLE M88A1	78.4	0.0	108.2
G82500	REC VEHICLE M88A1..ADV PROCUREMENT	22.3	0.0	0.0
G82916	ABRAMS TANK SERIES ROLL (MYP)	1126.0	1033.7	811.3
G82916	ABRAMS TANK SERIES ROLL (MYP) ADV PRO	246.9	245.0	368.3
GB1300	M1 SERIES TANK TRAINING DEVICES	0.0	12.9	14.5
	MODIFICATION OF TRACKED COMBAT VEHICLES			
GB1930	CARRIER, MOD	32.7	0.0	0.0
GZ2400	BFVS SERIES0512 (MOD)	45.0	84.1	109.3
GA0400	HOWITZER, MED SP FT 155mm M109 (MOD)	25.5	75.5	179.6
GA0700	TANK, M1 SERIES (MOD)	0.0	42.3	142.0
GZ3405	9WW	0.6	0.5	0.5
GA9003	HOST NATION SUPPORT	13.0	54.0	0.0
	SUPPORT EQUIPMENT AND FACILITIES			
GA0150	SPARES AND REPAIR PARTS (TCV-WTCV)	339.5	325.0	380.5
GL3100	ITEMS LESS THAN $2.0M (TCV-WTCV)	2.7	1.7	0.9
GA0050	PRODUCTION BASE SUPPORT (TCV-WTCV)	28.7	55.4	59.6
GA2449	REGIONAL MAINT TRAIN SITES-EQUIP	16.2	6.4	10.0
	WEAPONS AND OTHER COMBAT VEHICLES			
G01300	HOWITZER, LIGHT, TOWED, 105MM, L119	30.5	24.6	25.7
G11101	MACHINE GUN, 7.62mm, M60	0.0	3.0	3.0
G12901	SQUAD AUTOMATIC WEAPON (SAW) 5.56MM	11.0	8.7	9.1
GA0510	SOF WEAPONS	0.0	1.9	1.9
G13400	GRENADE LAUNCHER, AUTO, 40MM, MK19-3	12.0	19.7	19.9
G71100	LAUNCHER, SMOKE GRENADE	1.6	1.6	1.7
G03000	MORTAR, 120MM	5.0	10.9	11.9
G14900	M16 RIFLE	22.3	14.2	14.3

FY90 PROCUREMENT WEAPON TRACKED COMBAT VEHICLES, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
G04200	SNIPER WEAPON SYSTEM	2.2	3.8	0.0
G15300	PERSONAL DEFENSE WEAPON, 9MM	7.0	7.5	7.8
G21100	VEH RAPID FIRE WPN SYS-BUSHMAST(MYP)	29.5	18.7	20.6
G21100	VEH RAPID FIRE-BUSHMASTER ADV PROC	0.4	0.0	2.0
MODIFICATION OF WEAPONS AND OTHER COMBAT				
GZ2800	M16A1 RIFLE MODS	1.8	4.0	4.4
GC0925	MODIFICATIONS UNDER $2.0M (WOCV-WTCV)	4.5	0.5	0.5
SUPPORT EQUIPMENT AND FACILITIES				
GC0150	SPARES AND REPAIR PARTS (WOCV-WTCV)	26.4	27.0	14.3
GL3200	ITEMS LESS THAN $2.0M (WOCV-WTCV)	4.2	1.0	1.9
GC0050	PRODUCTION BASE SUPPORT (WOCV-WTCV)	9.3	14.1	19.3
	TOTAL WEAPON TRACKED COMBAT VEHICLES	2820.3	2745.0	3002.1

FY90 PROCUREMENT AMMUNITION, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
	AMMUNITION			
ATOMIC MATERIEL				
EA0050	NUCLEAR WEAPONS SUPPORT MATERIEL	8.9	6.5	6.1
CONTROLLED ITEMS				
E00700	CTG, 5.56MM, ALL TYPES	78.2	41.7	56.9
E00701	CTG, 5.56MM, BALL M193			
E00702	CTG, 5.56MM, TRACER			
E00703	CTG, 5.56MM, TRACER CLIP			
E01100	CTG, 5.56MM, BLANK M200			
E01101	CTG, 5.56MM, BLK M200, LKD F/SAW			
E04600	CTG, 5.56MM, 4 BALL M855/1 TRCRM856LKD			
E04601	CTG, 5.56MM, BALL M16-A2			
E75500	CTG, 5.56MM, PLASTIC-M862			
E04602	CTG, 5.56MM, TRACER M16-A2			
E02000	CTG, 7.62MM, ALL TYPES	51.8	18.8	21.6
E02002	CTG, 7.62MM, 4 BALL MBO/1 TRCR M62 LK			
E02003	CTG, 7.62MM, BALL M80 LKD/M13			
E02007	CTG, 7.62MM, LKD 4 BALL ITRACER OHF			
E01902	CTG, 7.62MM, BLANK M82 LKD/M13			
E05700	CTG, CAL .45, BALL M1911	1.3		
E07000	CTG, CAL .50, PLASTIC LKD4 BALL/ 1 TRCR	3.0		
E07100	CTG, CAL 50, BALL LKD	0.0	1.4	2.0
E07304	CTG, CAL 50 BLANK T928 W/M9 LK	0.2	0.0	0.0
E08904	CTG, 20MM,LKDTP-T M220 SER MLB M14A2	6.3	15.0	15.0
E08902	CTG, 20MM, LKD 4 TP M55A2/1TP-T M220	2.9	0.0	3.1
E08201	CTG, 25MM, HEI-T M792 W/F	0.0	0.0	9.6
E08203	CTG, 25MM, TPT LKD M793 MLB M28	10.2	0.0	0.0
E08204	CTG, 25MM, AP TRNG, M910	45.2	14.4	30.6
E08210	CTG, 25MM, APFSDS-T, M919	0.0	9.1	28.3
E10100	CTG, 30MM, LKD TP M788	6.0	10.0	8.8
ER8001	CTG, 40MM, ALL TYPES	8.4	46.9	25.5
E11801	CTG, 40MM, HEDP M430			
E71100	CTG, 40MM, TP F/MK19			
E13300	CTG, 40MM, GREEN STAR PARACHUTE			
E74200	CTG, 40MM, PRAC M781			
E12100	CTG, 40MM, WHITE STAR CLUSTER M585			
E12400	CTG, 40MM, RED STAR, PARACHUTE			
E13201	CTG, 40MM, CS M651			
E72000	CTG, MORTAR, COMM, 1/10 PRAC M840	0.0	6.4	5.0
E70500	CTG, 60MM, SMOKE WPLWCMS M722	4.1	3.6	3.9
E67303	CTG, 60MM, HE M72OW/M734 MOF	0.0	12.7	0.0

FY90 PROCUREMENT AMMUNTION, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
E19800	CTG, 81mm:\1/10 RNG, PRAC, XM880	4.5	0.0	0.0
E25100	CTG, 4.2-IN HE M329A2 W/O FUZE	15.0	11.3	0.0
E25200	CTG, 4.2 IN MORTAR ILLUMINATING	18.7	0.0	0.0
E25501	CTG, 120MM, HE, XM934	6.8	0.0	21.4
E25502	CTG, 120MM,HE W/PD FUZE	14.6	0.0	22.4
E25504	CTG, 120MM, SMOKE, XM929	12.1	0.0	16.7
E71600	CTG, TANK, 35MM, SUBCAL PRDA	5.5	15.2	11.4
E24000	CTG, 105MM, TP-T, M490A1	0.0	22.9	15.7
E22100	CTG, 105MM, DS-TP M724A1	25.8	55.9	43.7
E73100	CTG, 120MM APFSDS-T M829	130.6	0.0	0.0
E73200	CTG, 120MM HEAT-MP-T, M830(MYP)	29.5	0.0	0.0
E73300	CTG, 120MM TP-T M831 (MYP)	44.2	28.5	32.6
E15200	CTG, ARTY, 75MM, BLANK, M337A1	0.0	1.8	0.0
E53700	CTG, ARTY, 105MM, HERA, M913	0.0	15.9	21.0
E73400	CTG, 120MM TPCSDS-T, M865(MYP)	75.7	63.5	61.7
E28100	PROJ, 155MM, HE, ICM M483	103.2	0.0	0.0
E67800	PROJ, 155MM, SMK, WP, M825	4.5	0.0	0.0
E67200	PROJ, I55MM, HE, ADAM M731	51.5	62.1	0.0
E67501	PROJ, 155MM, HE, RAAMS M718	22.3	0.0	0.0
E67502	PROJ, 155MM, HE RAAMS M741	21.2	47.4	0.0
E68500	PROJ, 155MM, BASEBLEED, XM864	111.7	178.7	89.7
E69800	PROJ. 155MM, TRAINING, M804	15.7	0.0	17.7
E27201	CHARGE, PROPELLING,M155MM GREEN BAG M3	0.0	11.7	0.0
E27303	CHARGE, PROPELLING,M15SMM,RED BAG M203	129.7	106.3	67.6
E27100	CHARGE, PROPELLING,M155MM,RED BAG M119	29.1	0.0	0.0
E66600	PROJ, 8-INCH, HE, RAP, M650	37.0	0.0	0.0
E62208	FUZE, PD M739/M739A1	0.0	13.7	0.0
E61302	FUZE, MTSQ M577/M577A1	5.6	0.0	0.0
E61503	FUZE, MTSQ M582/MS82A1	10.3	0.0	0.0
E76300	FUZE, ET XM762	23.2	47.4	28.8
E63000	PRIMER, PERC, M82	0.7	0.0	0.0
EA0800	TRAINING DEVICE, MINE SYSTEM	0.2	0.1	0.2
E40602	GROUND IMP MINE SCAT SYS AT M75 (MYP)	5.0	0.0	0.0
E72194	CANISTER MINE (VOLCANO) PRACTICE M88	2.4	0.0	1.6
E72195	CANISTER MINE (VOLCANO) XM87	54.6	81.0	57.4
E76900	MTR RKT 5 IN MK22 MOD4	7.8	6.9	6.0
E75100	LINE CHARGE M58A3 (MICLIC)	35.7	9.9	7.7
E71200	MODULAR PACK MINE SYSTEM	33.1	40.6	8.8
E55400	DEMOLITION MUNITIONS & OTHER	22.4	0.0	10.5

FY90 PROCUREMENT AMMUNITION, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
ER0002	RANGER, ANTI-ARMOR WPN SYS (SOF)	0.0	3.7	6.2
E36100	LIGHTWEIGHT MULTI-PURPOSE WEAPON	71.6	56.0	0.0
E32900	LIGHT WGT MULTI-PURPOSE SYSTEM TRNR	3.3	3.9	3.9
E52200	ROCKET, HYDRA 70, ILLUM, M257	0.0	15.6	13.0
E37309	HYDRA 70 RKT HE/RS (M151/M433)	16.6	0.0	10.1
E37330	HYDRA 70 RKT SMOKE M264	0.0	1.2	1.2
E37334	HYDRA 70 RKT, MPSM PRAC M267	0.0	3.9	6.0
E37335	HYDRA 70 RKDT, HE/PD(M151/M423/MK66)	0.0	8.8	8.8
E37337	HYDRA 70 ROCKET0512 XM274 SIG PRACTICE	44.3	51.2	46.4
E28900	CTG, 165MM, COMB ENG VEH, 7P	0.0	8.1	0.0
E57200	LINEAR SHAPED CHARGE	2.8	0.0	0.0
E57300	TIME DELAY FIRING DEVICE (SOF)	0.0	0.0	2.0
E34000	GRENADE, HAND, ALL TYPES	6.9	12.6	3.0
E46900	SIGNALS, ALL TYPES	1.2	5.0	8.6
E51200	SIMULATORS, ALL TYPES	4.1	5.3	7.7
MISCELLANEOUS				
EB0016	AMMO COMPONENTS/SUPPORT, ALL TYPES	22.7	25.6	21.7
E77000	CAD/PAD	6.8	7.2	7.8
EA0055	ITEMS LESS THAN $2.0m (MISC-AMMO)	9.0	7.1	6.3
E76700	EOD EXPLOSIVE ITEMS	0.0	2.3	1.4
EA0650	SPARES AND REPAIR PARTS	2.5	9.1	0.0
EA0575	AMMUNITION PECULIAR EQUIPMENT	6.7	7.1	5.8
E64500	NITROGUANIDINE (LB)	15.8	22.8	28.9
EA8000	AMMO 9WW/ELT	2.8	2.0	2.0
EA8200	HOST NATION SUPPORT	29.1	18.2	17.9
	AMMUNITION PRODUCTION BASE SUPPORT			
PRODUCTION BASE SUPPORT				
EP1000	PROVISION OF INDUSTRIAL FACILITIES	164.2	125.3	181.6
EA0054	COMPONENTS FOR PROVE-OUT	14.3	7.0	12.6
EP2000	LAYAWAY OF INDUSTRIAL FACILITIES	19.5	40.0	25.5
EP1300	RDX FACILITY	72.3		
EP4000	JEFFERSON PROVING GRD MODERNIZATION	1.0	2.0	0.0
	TOTAL AMMUNITION PROCUREMENT, ARMY	2005.2	1735.7	1542.3

FY90 OTHER PROCUREMENT, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
	TACTICAL AND SUPPORT VEHICLES			
	TACTICAL VEHICLES			
DA0100	TACTICAL TRAILERS/DOLLY SETS	21.6	19.3	15.3
D01500	SEMITRAILER BB/CONT 22 1/2T M871 C/S	25.7	0.0	15.4
D01600	SEMITRAILER BB/CONT 34T M872 C/S	2.1	0.0	0.0
D00700	SEMITRAILER, LOW BED, 40T M870 (C/S)	6.6	0.0	0.0
D02300	SEMITRAILER, TANK, 5000G	21.4	1.2	0.0
D02700	SEMITRAILER, TANK, 7500G, BULKHAUL	9.8	0.0	0.0
D03200	SEMITRAILER,VAN ELEC 6T 2W M373A2	6.0	0.0	0.0
D04900	SEMITRAILER,VAN ASL, IOT	0.0	0.0	11.8
D15500	FMTV	0.0	0.0	78.0
D15400	HI MOB MULT-PUR WHL VEH(HMMWV)(MYP)	157.8	222.5	252.6
D19000	SMALL UNIT SUPPORT VEHICLE (SUSV)	8.8	28.4	29.2
D14000	TRUCK, 5T, 6X6, ABT (MYP)	223.7	0.0	0.0
DVO012	HEAVY EQUIP TRANSPORTER	0.0	35.0	95.8
D16200	TRUCK, IOT, 8X8, ABT (MYP)	238.4	7.5	3.5
D16500	FHTV	0.0	43.3	236.5
D15900	TRUCK, TRACTOR, LINE HAUL, M915AI	23.1	9.7	0.0
DA0925	MODIFICATION OF IN SERVICE EQUIPMENT	0.1	3.1	0.8
G38900	SHOP EQUIPMENT, AUTO MAINT & REPAIR	1.9	0.0	0.0
DL5110	ITEMS LESS THAN $2.OM (TAC VEH)	0.6	3.5	1.5
	NON-TACTICAL VEHICLES			
D23000	PASSENGER CARRYING VEHICLES	2.2	2.0	2.3
D24850	GENERAL PURPOSE VEHICLES	1.3	5.0	6.0
D25500	TRUCK, CARGO, PICKUP, 4X2	0.4	0.0	0.0
D26300	TRUCK, CARRYALL	0.3	0.0	0.0
D25000	SPECIAL PURPOSE VEHICLES	13.8	7.7	6.7
	SUPPORT EQUIPMENT AND FACILITIES			
DA0350	SPARES AND REPAIR PARTS (TAC)	42.5	56.9	84.1
DA0400	PRODUCTION BASE SUPPORT (TAC)	0.7	1.4	1.0
	COMMUNICATIONS AND ELECTRONICS			
	TELECOM EQUIP - READ CMD COMM			
BB5777	JCSE EQUIPMENT (USREDCOM)	42.8	2.4	4.3
BB2000	CLASSIFIED PROJECT 9WW	22.5	8.5	9.0
BB2001	TRACTOR SEAT	0.0	0.6	1.0
	TELECOM EQUIP- JOINT TACTICAL COMM PR			
BA1010	TRI-TAC EQUIPMENT	112.4	22.1	24.9

FY90 OTHER PROCUREMENT, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
BB1610	MOB SUBSCRIBER EQUIP	991.1	984.7	345.6
BB1600	MOD OF IN-SVC EQ (TRI-TAC)	23.0	0.0	0.0
TELECOMM EQUIP-COMBAT SUPPORT COMM				
Z16800	BECS	11.0	33.2	31.0
BW0006	SINCGARS FAMILY	236.8	315.7	314.5
BC2200	SOF MOD RADIOS	95.9	26.5	47.9
W18300	SMALL UNIT TRANSCEIVER	4.7	4.0	0.0
W11900	SMALL UNIT TRANSCEIVER (SOF)	0.1	0.0	0.0
BB1550	MOD OF IN SVC EQUIP (SMC)	6.3	4.2	4.3
BZ8250	SW ASIA/COMM INFRSTRUCTURE	11.5	17.1	6.1
BA5210	ITEMS LESS THAN $2.0M (CSC-C-E)	2.2	0.2	0.0
BA5200	SOF ITEMS UNDER $2.0 MILLION (SCS-C-E)	1.0	0.0	0.0
BA8110	SECURE CONF PROJECT	0.0	2.2	1.1
TELECOMM EQUIP-STARCOM NON-DCS				
BU3770	AR TELECOM AUTO PR (ATCAP)	4.6	3.1	2.5
BU4160	C-E FACILITIES/PROJECTS	2.9	2.1	3.1
BU4000	SOUTHCOM C3 UPGRADE	0.0	13.9	10.9
BW0020	SOUTHCOM INTELL MGMT SYS	0.0	1.9	2.0
BD3100	ELECTROMAG COMP PROG (EMCP)	0.0	0.5	0.4
LONG-HAUL COM (DCS)				
BU0300	DEFENSE DATA NETWORK (DDN)	0.0	0.6	2.6
BU2000	TRANSMISSION MEDIA EUROPE	0.0	5.1	6.9
BU2100	TRANSMISSION MEDIA (PACOM)	0.0	0.4	0.8
BU3610	WW TECH CON IMP PR (WWTCIP)	0.0	3.0	4.0
TELECOM EQUIP-STARCOM-GRD ENVIRON				
BB8501	DIGITAL EQUIPMENT (DSCS)	7.0	5.7	8.3
BB8504	INTERCONNECT FACILITY (DSCS)	3.0	5.6	3.1
BA8300	JAM RESISTANT SECURE COM (JRSC)	3.0	4.9	4.9
BB8509	DSCS OPERATIONS CONTROL SYS (DOCS)	42.2	20.7	20.9
BB8416	MOD IN-SVC EQUIP (DSCS)	3.3	1.9	3.6
K28900	MPK SAT UHF TERM, AN/PSC-3 (SOF)	1.3	0.0	0.0
K45900	VEH SAT UHF TERM, AN/VSC-7	0.6	0.0	0.0
K77200	ADV MANPACK UHF TERM COMSEC DEVICE (K77200)	0.0	0.0	1.5
K23700	SINGLE CHANNEL OBJ TACT TERM (SCOTT)	36.3	38.6	71.8
BB8417	MOD IN-SVC EQUIP (TAC SAT)	3.4	2.6	3.2
W43000	SINGLE CHANNEL UHF DAMA	0.0	0.0	1.4
K49500	GMF CONTROL	0.0	0.0	1.0

FY90 OTHER PROCUREMENT, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
TELECOM EQUIP-COMSEC EQUIPMENT				
BA8200	EUCOM ALTERNATE SPT HQ (ASH)	0.0	5.4	0.0
BA8250	USAREUR C2 PROJECT(TACTICAL CMD&CTRL)	5.8	5.1	5.6
TELECOMM EQUIP-COMSEC EQUIPMENT				
TA0400	IFF COMSEC	4.8	0.0	0.0
TA0500	TRUNK ENCRYPTION DEVICES (TED)	6.6	10.0	7.5
TA0600	MINTERM KY-99	0.0	6.2	5.8
T68000	AUTO KEY DC KGX-93/TSEC	1.0	0.0	0.0
BZ8950	SECURE VOICE IMPROVEMENT PRG(COMSEC)	22.6	1.5	1.7
T54000	DED LOOP ENCRYP DEV KG-84	8.6	11.4	10.7
T06400	COMSEC MODULE, TSEC/KGV-13	6.1	0.0	0.0
T99500	FREQ MODULE, KGV-10/TSEC	10.8	0.0	0.0
T06300	ADDS COMSEC KOK-13	0.0	0.1	3.0
BL5264	ITEMS LESS THAN $2.0M (COMSEC)	3.4	6.0	6.0
BL5265	ITEMS UNDER $2.0 MILLION (COMSEC) SOF	0.2	0.0	0.0
TELECOM EQUIP-BASE COMM				
BB8700	INFO SYS CONUS/WESTERN HEMISPHERE	14.0	18.5	11.2
BU4165	LOCAL AREA NETWORK (LAN)	0.0	0.5	4.7
BB8800	INFORMATION SYSTEMS (EUCOM)	3.9	8.9	8.8
BB8900	INFORMATION SYSTEMS (PACOM)	7.0	1.7	3.8
BB1400	INFO SYS-MCA SUPPORT	0.0	23.3	21.8
BQO100	PENTAGON TELECOM CTR (PTC)	0.0	1.2	3.3
BB7600	ARMY PRNTG AND BNDG EQUIP	0.0	3.0	3.4
TMDE FOR TELECOMM				
BZ5269	CALIBRATION SETS EQUIPMENT	22.0	14.4	15.4
BZ5270	TMDE MODERNIZATION	16.7	22.6	20.3
OTHER ELECT SYS/EQUIP-INTELLIGENCE				
BB2050	4TH PSYOP GROUP (SOF)	11.2	10.1	10.2
V15900	SINGLE SOURCE PROCESSOR - SIGINT	4.6	0.0	0.0

FY90 OTHER PROCUREMENT, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
BL5278	ITEMS LESS THAN $2.OM (INT-SPT-C-E)	1.3	5.3	4.5
BB6010	FT DEVENS TRNG SPT	0.5	0.0	0.0
OTHER ELECT SYS/EQUIP-AUTO DATA PROC				
BD3970	STARNET/VIABLE	2.0	2.0	2.8
BD3950	AMC INFO PROCESSING EQUIP (IPE)	13.0	20.9	15.1
B28600	ADV FIELD ARTILLERY TACT DATA SYS	0.0	7.4	16.4
BU1400	ARMY DATA DISTRIBUTION SYSTEM-ADDS	74.1	48.8	223.3
B28700	LIGHT TACFIRE	13.2	0.0	0.0
BZ9200	TRADOC AUTOMATION	0.5	5.6	2.7
BD3955	LIFE CYCLE SOFTWARE SUP (LCCS)	9.2	0.5	0.5
BE4152	SUPERCOMPUTERS	27.3	0.0	0.0
BE4159	EUSA-C3I INITIATIVES	8.6	7.2	5.4
BE2000	ACQN INFO MAN	0.0	2.9	6.6
BE4161	HQ AUTOMATION SYSTEMS	9.2	36.7	31.4
BE4162	INFO PROC EQUIP	0.0	8.2	8.4
BE4163	MEDICAL AUTOMATION SYSTEMS	1.6	2.6	2.3
BE4164	PERSONNEL AUTOMATION SYSTEMS	11.2	11.2	12.5
BE4165	TRAINING AUTOMATION SYSTEMS	0.0	1.0	0.0
BE4166	LOGISTICS AUTOMATION SYSTEMS	7.4	15.0	7.5
BE4167	RESERVE COMPONENT AUTOMATION SYSTEMS	34.5	0.0	0.0
W34600	CBT SVE SPT CONTR SYS	0.0	1.0	0.3
BZ9851	FORWARD ENTRY DEVICE	4.5	24.6	21.2
BA9300	MANEUVER CNTRL SYSTEM	9.6	13.9	0.0
BE4000	ARMY RESERVES HQ INFO SYS	0.0	8.0	5.3
BZ9350	CORPS/THEATER ADP SVC CTR (CTASC)	7.6	17.7	23.5
W00800	TACT ARMY CMBT COMPT SY (TACCS)	23.5	24.9	21.6
AD5050	FAADC2	0.0	0.0	52.8
AD5054	TRACTOR BALL	0.0	1.0	4.5
AD5055	TRACTOR CRASH	0.0	14.6	23.0
WK5053	FAAD GBS	0.0	48.2	48.5
BZ8888	UNIT LEVEL COMPUTER	0.0	14.8	11.4
AD5051	POSITIVE HOSTILE ID	0.0	0.0	2.3
BZ8889	CSS LOG APL AUTO MARK/RD SYM(LOG MAR)	7.5	8.0	11.9
BE4100	WWMCCS INFORMATION SYSTEM (WIS)	18.2	31.9	31.9
AUDIO VISUAL				
BZ8480	AFRTS (AUDIO VISUAL)	5.2	5.9	6.2
BL5289	ITEMS LESS THAN $2.OM (A/V C-E)	5.1	2.0	2.0
BL5290	TACTICAL ELEC NEWS GATHERING EQUIP	1.9	0.0	0.0

FY90 OTHER PROCUREMENT, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
OTHER ELECT SYS/EQUIP-WARFARE				
BZ7327	MOD IN SVC EQUIP (EW)	10.8	8.4	0.0
BL5292	ITEMS LESS THAN $2.OM (EW-C-E)	0.9	0.0	0.0
OTHER ELECT SYS/EQUIP-TACICAL ELEC				
K02900	POWER SUPPLY, PP-6224	3.2	0.0	0.0
B92400	COMPUTER/INDICATOR, CP-696/PD	6.4	6.7	6.9
K27800	LIGHTWEIGHT ARTY MET SYS (LAWS)	4.0	0.0	0.0
B53800	MINI EYESAF LASER INFRD OBS SET AN/PVS-6	0.0	0.0	12.4
BZ7900	PHYSICAL SECURITY EQUIPMENT	16.2	12.7	8.2
M60200	FACILITY INTRUSION DETECTION SYSTEM	10.3	5.7	2.9
KA4300	NAVSTAR USER EQUIPMENT	14.7	27.0	32.8
M75700	POS/AZIMUTH DETERMINING SYS (PADS)	15.4	0.0	0.0
KA3500	NIGHT VISION GOGGLES	137.5	45.3	45.5
K35000	AIMING LIGHT INFRARED, AN/PAQ-4	1.9	1.5	2.5
K41500	NIGHT VISION SIGHT INDIV WPN N/PVS-4	14.0	14.9	14.6
B43300	RADIAC SET AN/VDR-2	2.8	8.7	10.9
BP1002	IMP-REMBASS (SOF)	0.0	0.0	10.1
B47100	MULTIFUNCTION RADAR TRANSPONDER BEACO	7.4	2.2	0.0
KA4200	ELECTRONIC MAINTENANCE SHOPS	3.7	0.0	0.0
BZ7325	MOD OF IN SVC EQUIP (TAC EL)	26.6	11.2	8.3
BL5295	ITEMS LESS THAN $2.OM (TACT ELEC-C-E)	6.3	1.6	0.0
TMDE FOR TACTICAL ELECTRONICS				
KA4000	INTERMEDIATE FORWARD TEST EQUIP	34.8	39.7	34.2
M87001	TMDE FOR STE/ICE	1.8	0.0	0.0
M87003	CORE ELEC AUTO TEST (CSTE-X)	2.7	2.0	2.0
OTHER ELECT SYS/EQUIP-SUP EQ AND FAC				
BA9400	SP/REP PARTS	321.5	317.4	313.7
BF5500	SPECIAL PROGRAMS	59.3	59.9	70.6
BB9051	PR ENH CAP I W PR/QWK RT INV PR	7.1	14.7	14.8
BF5400	PRODUCTION BASE SUPPORT (C-E)	7.7	9.6	12.0

FY90 OTHER PROCUREMENT, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
	OTHER SUPPORT EQUIPMENT			
	CHEMICAL DEFENSIVE EQUIPMENT			
MA0030	MODULAR DECON SYS	0.0	0.0	1.6
M67400	DECONTAMINATE APP PWR DR LT WT XM17	5.0	0.0	8.6
MA5000	MASK, PROTECTIVE, NBC	4.5	56.0	60.6
M99500	MASK, ACFT	0.0	9.9	27.5
S02200	CHEMICAL AGENT MONITOR	0.0	19.8	20.4
M97400	SIMP COLL PROT EQUIP XM20	4.7	6.2	3.7
SX8001	COLL PROT EQUIP, NBC TEMPER	0.0	0.0	4.4
	BRIDGING EQUIPMENT			
MA2844	HEAVY ASSAULT BRIDGE	0.0	0.0	21.8
MA8810	LIGHT ASSAULT BRIDGE	0.0	3.9	10.9
ML5315	ITEMS LESS THAN $2.O (BRIDGING)	0.7	0.8	0.6
	ENGINEER (NON-CONSTRUCTION) EQUIPMENT			
G39100	DISPENSER MINE XM139	5.0	11.0	14.4
G22500	MIXING & PUMPING UNIT (MPU/TEXS)	0.0	0.0	3.0
X00700	MARKING SYS, CLEAR LANE	1.8	0.0	0.0
M17900	DETECTING SET, MINE, AN/PSS-12	3.8	0.0	0.0
R06100	MINE PLOW (BLADE)	8.3	0.0	0.0
XO0600	MINE CLEARING ROLLER	1.4	0.0	0.0
R21000	VEHICLE MAGNETIC SIGN DUP	0.0	0.0	4.8
M05900	M-9 ARMORED CMBT EARTHMOVER(ACE)(MYP)	62.0	61.8	63.3
ML5320	ITEMS LESS THAN $2.OM (ENG NON-CONST)	1.0	0.0	0.0
MA7800	MOD IN-SVC EQ (ENGR-NC)	0.3	0.0	1.0
	COMBAT SERVICE SUPPORT EQUIPMENT			
MF9300	AIR COND VARIOUS SIZE/CAPACITIES	9.8	6.9	3.0
M86600	FIELD KITCHEN, MOBILE, TRL MTD	15.8	0.0	0.0
M83200	BAKERY PLANT FIELD	0.0	0.0	8.2
R12200	RIGID WALL SHELTER CMD POST ANNEX	0.0	4.8	6.6
MA9500	DIVING EQUIPMENT	2.9	2.0	0.0
MA9600	FIRETRUCKS	4.6	0.0	0.0
M87600	LAUNDRY UNIT/TRL MTD	5.9	0.0	12.0
MB2000	ARMY PRINTING AND BINDING EQUIPMENT	2.6	0.0	0.0
ML5325	ITEMS LESS THAN $2.OM (CCS-EQ)	15.1	5.3	3.4
MA8100	MOD OF IN SVC EQUIPMENT (CSE)	0.7	0.8	0.0
MA8060	SOF ITEMS LESS THAN 2.0	0.0	0.7	0.7
	PETROLEUM EQUIPMENT			
M19000	TANK ASSEMBLY FAB COLL POS 5000OG	3.7	2.3	3.0

FY90 OTHER PROCUREMENT, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
M64900	TANK ASSEMBLY FAB COLLAPSIBLE 10K G	5.6	1.1	3.1
R21400	TANK ASSEMBLY FAB COLL, 20K GAL POL	0.0	0.0	3.3
M62300	TANK/PUMP UNIT LIQ DISP F/TRK MNT	5.1	3.0	0.0
M73300	LAB, PETROLEUM, SEMI-TRLR MTO	1.6	1.5	3.8
M63900	PUMP ASBLY LIQ GAS WHL 4 IN OUT 350GP	0.0	0.0	7.5
MA5120	SWA PETROLEUM DISTRIBUTION	31.0	42.1	55.6
ML5330	ITEMS LESS THAN $2.0M (POL)	3.2	1.5	2.0
WATER EQUIPMENT				
R05100	WTR PUR LTNIT REV OS 3000 GPH (ROWPU)	11.7	14.3	15.9
M15000	TANK, FAB,COLL,3K GAL WATER (ONION)	2.4	1.1	2.5
M11400	WATER QUALITY ANALYSIS SET PURIF	0.0	0.0	1.0
ML5335	ITEMS LESS THAN $2.0M (WATER EQ)	3.1	3.0	5.6
MEDICAL EQUIPMENT				
MN1000	COMBAT SUPPORT MEDICAL	103.9	67.3	67.3
MA9900	MEDICAL SUPPORT EQUIPMENT	58.3	60.6	62.4
MAINTENANCE EQUIPMENT				
M62700	WELDING SHOP, TRAILER MTD	4.4	0.6	0.0
M61600	SHOP EQ ELECTRICAL RPR SEMI-TRL MTD	0.5	0.0	0.0
ML5345	ITEMS LESS THAN $2.0M (MAINT EQ)	1.3	11.3	9.7
CONSTRUCTION EQUIPMENT				
R04800	SMALL EMPLACEMENT EXCAVATOR (SEE)	32.6	0.0	18.3
MA8300	MODS OF IN SVC EQUIP (CONST EQUIP)	0.2	2.0	0.0
ML5350	ITEMS LESS THAN $2.0M (CONST EQUIP)	11.3	3.1	3.4
RAIL FLOAT CONTAINERIZATION EQUIPMENT				
M34200	LANDING, CRAFT, UTILITY	46.7	0.0	0.0
M44600	TUG INLAND & COAST WATERWAYS	7.5	0.0	0.0
R97500	CAUSEWAY SYSTEMS	3.0	0.0	3.5

FY90 OTHER PROCUREMENT, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
MA8950	MOD OF IN-SVC EQU (FLOAT/RAIL)	3.3	1.7	1.9
ML5355	ITEMS LESS THAN $2.0M (FLOAT/RAIL)	3.0	0.1	2.3
MA9800	GENERATORS AND ASSOCIATED EQUIP	29.6	41.9	52.4
MATERIAL HANDLING EQUIPMENT				
M48800	TRUCK, FORKLIFT, DE, PT, RT	0.0	0.0	11.6
M48900	TRUCK, FORKLIFT, DE, PT, RT, 6000 LB	21.5	21.3	20.0
M41300	TRUCK, FORKLIFT, DE, PT, RT, 4000 LB	0.0	14.1	11.8
X00900	65 TON CRANE	6.3	0.0	0.0
ML5365	ITEMS LESS THAN $2.0M (MHE)	1.2	1.0	4.6
OTHER SUPPORT EQUIPMENT				
MB7000	BASE LEVEL EQUIP	0.0	27.7	29.7
MA5550	PROD ENHAN CAPIT INVET	0.0	4.9	4.9
MA5500	QUICK RET ON INVEST	0.0	2.6	2.6
MA0350	SPARES AND REPAIR PARTS (OTHER)	48.2	30.2	38.8
MB2100	AREA ORIENTED DEPOT UPGRADE	4.0	30.5	30.5
MA0450	PRODUCTION BASE SUPPORT (OTHER)	9.1	15.3	13.6
MA5600	OSD PRODUCTIVITY INVESTMENT FUNDING	10.0	34.1	36.4
MA9300	MFNG METH & TECH	0.0	9.0	8.9
MA6700	SPECIAL EQUIPMENT FOR USER TESTING	14.8	8.1	6.7
MA5175	HOST NATION SUPPORT - EUROPE	57.4	122.3	0.0
MA6600	NATIONAL TRAINING CTR SUP	25.7	20.9	23.8
NA0100	TRAINING DEVICES, NONSYSTEM	103.8	140.3	87.0
NA0170	SIMNET	15.0	13.5	23.8
MB7100	NON-CENTRALLY MANAGED ITEMS	19.5	0.0	0.0
	TOTAL OTHER PROCUREMENT, ARMY	4660.0	4233.8	4282.4

FY90 RESEARCH, DEVELOPMENT, TEST & EVAL, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
	TECHNOLOGY BASE			
61101A	IN-HOUSE LAB INDEPENDENT RESEARCH	0.0	9.1	9.2
61102A	DEFENSE RESEARCH SCIENCES	172.7	175.9	182.2
61103A	UNIVERSITY RESEARCH INITIATIVES	0.0	21.9	22.2
62105A	MATERIALS	11.0	13.4	13.6
62120A	ELEC SURVIVABILITY AND FUZING TECH	37.3	28.2	28.0
62122A	SURVIVABILITY ENHANCEMENT	5.6	5.9	6.1
62211A	AVIATION TECHNOLOGY	45.7	41.5	42.1
62303A	MISSILE TECHNOLOGY	21.8	31.0	30.5
62307A	LASER WEAPON TECHNOLOGY	6.3	0.6	0.5
62601A	TANK AND AUTOMOTIVE TECHNOLOGY	22.2	37.2	40.3
62618A	BALLISTICS TECHNOLOGY	27.2	30.3	29.0
62622A	CHEMICAL AND SMOKE MUNITIONS	41.3	54.0	54.0
62623A	JOINT SERVICE SMALL ARMS PROGRAM	14.1	5.1	5.2
62624A	WEAPONS AND MUNITIONS TECHNOLOGY	31.1	39.1	40.0
62705A	ELECTRONICS AND ELECTRONIC DEVICE	21.7	18.2	18.4
62709A	NIGHT VISION INVESTIGATIONS	25.3	19.3	19.8
62716A	HUMAN FACTOR ENGR TECH	15.0	15.0	15.3
62720A	ENVIRONMENTAL QUALITY HEALTH	9.5	12.0	12.2
62727A	NON-SYSTEM TRAINING DEVICES	3.4	4.4	4.5
62782A	C3 TECHNOLOGY	12.5	21.9	23.2
62783A	COMPUTER & SOFTWARE TECHNOLOGY	6.4	5.5	5.7
62784A	MILITARY ENGINEERING TEC	39.9	45.2	47.7
62785A	MANPOWER/PERSONNEL/TRAINING TECHNOLOG	17.8	17.1	17.1
62786A	LOGISTICS TECHNOLOGY	39.9	37.3	37.9
62787A	MEDICAL TECHNOLOGY	105.7	96.4	95.5
62788A	TRACTOR FLOP	0.0	1.8	1.8
	ADVANCED TECHNOLOGY DEVELOPMENT			
63001A	LOGISTICS ADVANCED TECHNOLOGY	9.8	12.5	12.0
63002A	MEDICAL ADVANCED TECHNOLOGY	34.3	34.7	37.2
63003A	AVIATION ADVANCED TECHNOLOGY	36.2	32.0	34.2
63004A	WEAPONS AND MUNITIONS ADVANCED TECH	76.5	48.8	33.2
63005A	COMBAT VEH & AUTO ADV TECH	58.7	139.5	164.4
63006A	C3 ADV TECH	7.7	11.7	11.1
63007A	HUMAN FACTORS/PSNL/TNG	29.4	18.9	19.7
630012	TRACTOR HOLE	0.0	9.1	4.5
630013	TRACTOR DIRT	0.0	1.8	1.2
63102A	MATERIALS AND STRUCTURES	6.9	4.7	5.2
63105A	ACQUIRED IMMUNE DEFICIENCY RESEARCH	27.0	0.0	0.0
63302A	JT TAC MISSILE DEF	31.3	36.1	35.0
63303A	MLRS TERM GUID WARHEAD	35.9	47.1	47.2
63313A	MSL/ROCKET COMPONENTS	13.5	10.7	8.8
63314A	HIGH ENERGY LASER & DIRECTED ENERGY	7.7	26.1	56.4
63324A	ARMY DEVELOPMENT AND EQUIP ACTIVITY	5.0	3.9	3.5
63606A	LANDMINE WARFARE/BARRIER DEV	9.0	11.3	14.0

FY90 RESEARCH, DEVELOPMENT, TEST EVAL, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
63607A	JOINT SERVICE SMALL ARMS PROGRAM	9.6	6.8	5.9
63710A	NIGHT VISION ADVANCED DEVEL	23.6	21.8	23.3
63833A	ENVIRONMENTAL QC EQUIP	7.3	0.0	0.0
63734A	ENGINEERING SYSTEMS	2.3	3.6	3.7
63742A	ADV ELECTRONIC DEVICES DEV	6.4	6.8	7.1
63758A	ARMY BATTLEFIELD TECH INTEGRATION	8.6	2.6	2.5
63759A	CB DEF/SMK ADV TECH DEMOS	3.4	4.0	4.0
63772A	ADV TACTICAL COMPUTER SCIENCE & TECHN	6.5	4.5	4.7
	TACTICAL PROGRAMS			
63612A	ADV ANTI-TANK WEAPON SYS(MEDIUM)	47.0	69.6	24.8
63313A	MSL/ROCKET ADV TECH	13.5	10.7	8.8
63314A	DIRECTED ENERGY	7.7	26.1	56.4
63324A	ADEA	5.0	4.0	3.5
63619A	LANDMINE/BARRIER SYSTEM	12.4	4.2	6.0
63627A	SMOKE MUNITIONS & MATERIEL CONCEPTS	5.0	8.8	12.2
63642A	MSAM	0.0	4.7	6.8
63706A	IDENT FRIEND OR FOE DEVELOPMENT	14.8	0.0	0.0
63713A	ARMY DATA DISTRIBUTION SYSTEM	19.8	19.4	13.1
63747A	SOLDIER SUPPORT/SURVIVABILITY	3.4	6.8	8.6
63757A	FORWARD AREA AIR DEFENSE SYSTEMS	96.9	20.2	0.0
63774A	NIGHT VISION SYS ADVANCED DEVELOPMENT	4.0	5.1	5.2
63776A	AIRBORNE ADVERSE WEATHER WEAPONS SYS	86.6	23.2	0.0
63777A	FOLLOW-ON LANCE - ADV DEV	7.4	0.0	0.0
63801A	AVIATION ADVANCED DEVELOPMENT	4.3	23.0	15.1
63802A	WEAPONS & MUNITIONS ADV DEV	22.2	48.1	47.6
63803A	CHEMICAL SYSTEMS ADV DEV	0.0	7.2	27.7
63804A	LOG & ENGR EQUIPMENT ADV DEV	12.9	17.7	15.9
63805A	CSS COMPUTER SYSTEM EVAL/ANALYSIS	1.4	6.3	8.1
63806A	CHEM/BIO DEFENSE EQUIP ADV DEV	7.4	20.0	24.2
63807A	MEDICAL SYSTEMS ADV DEV	36.1	27.3	28.4
64202A	AIRCRAFT WEAPONS	4.4	9.6	7.5
64216A	AIRCRAFT PROPULSION SYSTEM	55.5	51.7	53.0
64223A	LIGHT ARMED SCOUT HELICOPTER	124.0	240.7	446.6
64310A	HELIBORNE MISSILE - HELLFIRE	3.0	0.0	0.0
64313A	GRASS BLADE	4.7	0.0	0.0
64324A	ARMY TACTICAL MISSLE SYSTEM-ARMY	76.0	46.8	0.0
64604A	MED TAC VEH	24.8	18.4	6.9
64609A	SMOKE MUNITIONS AND MATERIEL	8.3	14.2	11.1
64611A	ADVANCED ANTI-TANK WPN SYS - ED	110.0	158.7	45.0
64622A	FAMILY OF HVY TACTICAL VEHICLES	28.7	5.4	0.0
64630A	M1A1 DEVELOPMENT PROGRAM	0.0	0.0	45.8
64709A	ID FRIEND OR FOE EQUIP DEV	25.6	25.1	21.3
64710A	NIGHT VISION DEVICES	17.6	19.4	17.5
64713A	COMBAT FEEDING, CLOTHING AND EQUIP	2.4	5.9	6.3
64715A	NONSYSTEM TRAINING DEVICES ENGINEERING	21.8	17.1	32.4
64723A	SPECIAL PURPOSE DETECTORS	0.5	0.5	0.5
64726A	METEOROLOGICAL EQUIP & SYSTEMS	1.6	0.0	0.0
64741A	AIR DEFENSE COMMAND, CONTROL & INTEL	92.4	71.7	75.7
64746A	AUTOMATIC TEST EQUIPMENT DEVELOPMENT	9.3	10.3	9.4
64770A	JOINT STARS	22.8	39.6	50.9

FY90 RESEARCH, DEVELOPMENT, TEST EVAL, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
64779A	JT INTEROP OF TAC CMD & CONT SYS	9.5	4.6	4.9
64801A	AVIATION ENG DEV	11.0	16.6	20.0
64802A	WEAPONS & MUNITIONS ENGNRNG DEV	12.0	9.4	6.4
64803A	CHEMICAL SYSTEMS ED	33.8	31.4	6.4
64804A	LOG & ENGR EQUIP ED	13.5	32.5	26.2
64805A	C3 ED	10.3	11.9	1.4
64806A	CHEM/BIO DEFENSE EQUIP ED	13.2	41.6	36.0
64807A	MEDICAL MATERIEL/MEDICAL BIO DEF ED	20.0	19.6	21.3
64808A	LANDMINE WARFARE/BARRIER EQUIP ED	14.8	13.7	18.3
64810A	FOG-M ENG DEV	96.5	139.3	98.3
64813A	TRACTOR PULL	0.0	4.9	34.7
64814A	SADARM ENG DEV	145.6	155.0	104.6
64815A	TRACTOR TRAILOR	0.0	4.9	5.0
64816A	AAWS ED	0.0	89.0	147.0
64817A	TRACTOR, BALL	16.0	9.6	2.5
64818A	ARMY TAC C3I	8.0	11.2	11.5
64819A	AAWS-H	0.0	0.0	79.0
64820A	FAAD GND BASED SENSOR	0.0	17.2	20.3
64821A	FOLLOW-ON LANCE	0.0	32.8	128.6
23726A	ADV FIELD ARTILLERY TACT DATA SYS	15.6	37.5	39.3
23735A	COMBAT VEHICLE IMPROVEMENT PGM	96.5	91.7	67.7
23739A	AN/TSQ-73 MODIFICATIONS AD C2I MODS	8.6	0.0	0.0
23740A	MANEUVER CONTROL SYSTEM	12.0	7.4	20.2
23743A	155MM SELF-PROPELLED HOWITZER IMPROV	24.4	10.7	3.7
23744A	AIRCRAFT MODIFICATIONS/PIP	90.2	110.5	72.8
23745A	EQUIPMENT UPGRADE	19.8	0.0	0.0
23751A	SPECIAL OPERATIONS FORCES EQUIPMENT	118.4	58.5	46.2
23752A	AIRCRAFT ENGINE COMPONENT IMPROVEMENT	5.7	5.8	6.9
23801A	MISSILE/AIR DEFENSE PIP	39.0	50.9	53.0
23802A	OTHER MISSILE PRODUCT IMPROVE PGM	40.0	49.3	45.4
23806A	TRACTOR RIG	0.0	14.0	22.7
23808A	TRACTORCARD	11.0	12.0	10.0
23809A	DRAGON III	5.5	0.0	0.0
27316A	TACIT RAINBOW	0.0	57.7	72.7
28010A	JOINT TACTICAL COMMO PROGRAM (TRITAC)	13.8	0.0	0.0
33145A	EUCOM C3 SYSTEMS	0.6	0.0	0.0
	INTELLIGENCE AND COMMUNICATIONS			
64716A	TERRAIN INFO	6.5	12.9	11.6
64778A	NAVSTAR GLOBAL POSITIONING SYSTEM	8.8	7.7	8.2
33142A	SATCOM GROUND ENVIRONMENT	26.5	43.1	35.1
	DEFENSEWIDE MISSION SUPPORT			
65301A	KWAJALEIN MISSLE RANGE	155.3	157.7	164.7
65601A	ARMY TEST RANGES AND FACILITIES	191.0	226.9	235.3
65602A	ARMY TECH TEST INSTRU & TARGETS	59.8	68.9	91.6
65603A	ARMY USER TEST INSTRU AND THREAT SIMU	43.7	67.4	60.1
65702A	MET SUPT TO RDTE ACTIVITIES	18.8	23.5	24.0

FY90 RESEARCH, DEVELOPMENT, TEST & EVAL, ARMY

SSN	NOMENCLATURE	FY89	FY90	FY91
65706A	MATERIEL SYSTEMS ANALYSIS	23.7	25.5	26.0
65712A	SUPPORT OF OPERATIONAL TESTING	51.2	70.9	75.1
65801A	PROGRAM WIDE ACTIVITIES	82.8	95.4	97.5
65802A	INTL COOPERATIVE RESEARCH AND DEV	1.1	1.8	1.9
65803A	TECHNICAL INFO ACTIVITIES	5.7	12.6	12.7
65805A	MUN STANDTRD EFFECTIVENESS & SAFETY	13.0	17.7	17.7
65810A	RDTE SUPP FOR NON-DEVELOP ITEMS	18.2	7.5	7.6
65872A	PRODUCTIVITY INVESTMENTS	49.7	19.2	19.2
65894A	REAL PROPERTY MAINTENANCE (RDT&E)	161.0	175.3	178.4
65896A	BASE OPERATIONS (RDT&E)	183.4	198.7	203.0
65898A	MGT HQ (RESEARCH/DEVELOPMENT)	9.9	14.8	15.0
78011A	INDUSTRIAL PREPAREDNESS	19.7	34.5	36.1
TOTAL RESEARCH DEVELOPMENT TEST & EVAL, ARMY		5117.4	5603.0	5873.7

TUESDAY, APRIL 11, 1989.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, NAVY

WITNESSES

THOMAS F. FAUGHT, JR., ASSISTANT SECRETARY OF THE NAVY FOR RESEARCH, ENGINEERING, AND SYSTEMS

VICE ADMIRAL PAUL F. McCARTHY, DIRECTOR OF RESEARCH AND DEVELOPMENT REQUIREMENTS, TEST AND EVALUATION

MAJOR GENERAL RAY "M" FRANKLIN, COMMANDING GENERAL, MARINE CORPS RESEARCH, DEVELOPMENT & ACQUISITION COMMAND

RICHARD RUMPF, PRINCIPAL DEPUTY, ASSISTANT SECRETARY OF THE NAVY FOR RESEARCH, ENGINEERING, AND SYSTEMS

REAR ADMIRAL DANIEL WOLKENSDORFER, DIRECTOR, ANTISUBMARINE WARFARE DEVELOPMENT

INTRODUCTION

Mr. MURTHA. The committee will come to order. Today we are pleased to welcome back Mr. Thomas F. Faught, Jr., who is the Assistant Secretary of the Navy for Research, Engineering, and Systems, and Vice Admiral Paul F. McCarthy, Director of Research and Development Requirements and Test and Evaluation programs for the U.S. Navy.

This morning the committee will receive testimony on the fiscal year 1990 budget request of the Navy for research, development, test and evaluation. The request totals $10.2 billion, which is a 9 percent increase over the appropriation for fiscal year 1989. The hearing will be closed due to the classification of the material to be discussed.

We welcome Secretary Faught and his assistants to the committee today. We appreciate the work you are doing.

Several of us were in a nuclear submarine over the weekend and we were darned glad that the research has been done appropriately. They were telling me up there that you see these articles about the Russians operating under the ice, but if they do, they don't practice it and I can assure you you don't operate under the ice, at least in my estimation, unless you train extensively because that is a tedious exercise to break through the ice.

It seems like a controlled crash to me. They did it well and I was very impressed by the Navy and the proficiency of the commanding officer of the U.S.S. *Sturgeon*, which we were aboard.

Admiral Demars was a perfect host. Mr. Livingston was just in the Arctic and he survived it. Those bunks are about half the size he needs and he still survived.

Mr. LIVINGSTON. My nose is still blue.

Mr. MURTHA. Secretary Faught, if you will put your entire statement in the record, and summarize for us, we will go right to the questions.

SUMMARY STATEMENT OF MR. FAUGHT

Mr. FAUGHT. Yes, Mr. Chairman. I would like to do that. You received our prepared remarks last week and I would like to make those part of the record.

I would like to summarize some of the things that we have accomplished this last year, if I may.

For the first time, and this will be a topic of the hearing today, we have formed a consolidated Antisubmarine Warfare Development office. We concluded a long-term look into the future. Our Navy 21 Study, which was under the auspices of Admiral McCarthy and his predecessor, projected Navy requirements into the years 2030 to 2040. We developed Navy's first long-term R&D plan, which identifies proposed major new programs by major warfare mission area for the next 15 years, through the year 2005. A major feature of this plan is R&D actions aimed at reducing cost.

The V-22, which we have been developing, is an innovation in aircraft design and function, realized its first flight. We met with over 200 industrialists and university leaders to attempt to find out how we can improve our R&D relationship between the Navy and them and make it more constructive.

We completed the first phase of a two-phase effort to cut significantly the time now required to develop major systems or weapons and get them into the hands of our Marines and sailors.

We have strengthened the international R&D program and Admiral McCarthy has initiated again for the first time, the Department's first long-range plan in this area.

The Navy's inter-service relationships have been strengthened. This year we have established with DOD and the Army and the Air Force, Joint Program Offices for very low observables, for ASAT, and for the air-to-air family of missiles.

In our long-range plan, MANTECH, an important feature of our future Navy R&D, is being expanded. Our two principal initiatives, one in Pennsylvania and the other in South Carolina are continuing.

With that as background, I would like to introduce one person today. He is the newest member of our team and he will certainly play a part in this morning's hearing, Rear Admiral Wolkensdorfer. He heads our Antisubmarine Development office. He has had extensive antisubmarine experience and will provide answers to whatever questions you may have in this vital area.

Mr. Chairman, thank you.

[The statement of Mr. Faught follows:]

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HOUSE APPROPRIATIONS COMMITTEE
SUBCOMMITTEE ON DEFENSE

STATEMENT OF

THOMAS F. FAUGHT, JR.

ASSISTANT SECRETARY OF THE NAVY

(RESEARCH, ENGINEERING AND SYSTEMS)

BEFORE THE

SUBCOMMITTEE ON DEFENSE

OF THE HOUSE APPROPRIATIONS COMMITTEE

ON THE FY 1990/1991

NAVY RESEARCH, DEVELOPMENT, TEST AND EVALUATION PROGRAM

APRIL 11, 1989

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HOUSE APPROPRIATIONS COMMITTEE
SUBCOMMITTEE ON DEFENSE

THOMAS F. FAUGHT, JR.

BIOGRAPHY

Thomas F. Faught, Jr., is the Assistant Secretary of the Navy for Research, Engineering and Systems. He is responsible for an annual budget of approximately $10 billion dollars for planning and directing research, development, engineering, testing and evaluation for the Navy and Marine Corps.

Prior to his Presidential appointment as Assistant Secretary, Mr. Faught was President and Chief Executive Officer of Dravo Corporation, a billion dollar, NYSE company. Dravo is engaged in project management, engineering, factory automation, construction, national resource development and materials handling systems manufacturing. Before becoming Dravo's CEO in 1983, he served the company as President and Chief Operating Officer and Chief Financial Officer, as well as being a member of the Board of Directors.

Prior to joining Dravo in 1974, Mr. Faught's industrial career included Gould, Inc., Booz, Allen & Hamilton, an international management consulting firm, and the Ford Motor Company, where he was an engineer and manufacturing manager.

In 1986 Financial World and The Wall Street Journal named Faught the Nation's outstanding engineering industry Chief Executive Officer.

Mr. Faught's background includes project management and project finance, technology transfer, factory automation systems development, program planning and control, manufacturing facility evaluation, research and development planning, and the planning and the oversight of counter-trade transactions.

He was born in Salem, Oregon, and is a graduate of Oregon State University where he received a BS degree. He also holds an MBA degree from Harvard University and did additional graduate work at The Massachusetts Institute of Technology concerning industrial applications of nuclear energy.

Mr. Faught served on the Board of Trustees of the Presbyterian University Hospital, WQED (Public Broadcasting and Television) and Carnegie Mellon University (CMU), all of Pittsburgh. He also was Vice Chairman of CMU's Board's Research Committee. In 1984 Mr. Faught was appointed by the President to the Advisory Committee of the Export-Import Bank of the United States, becoming Chairman of that committee in 1985. He earlier served on a Presidential Task Force to encourage the development of private enterprise abroad.

Mr. Faught served in the U.S. Marine Corps both as an enlisted man and as an officer. He is married to the former Lynda Clancy and they have two sons, ages four and two.

STATEMENT FOR THE SUBCOMMITTEE ON DEFENSE
HOUSE APPROPRIATIONS COMMITTEE

Thomas F. Faught, Jr.
April 11, 1989

Good morning Mr. Chairman, and distinguished members of the Subcommittee. A year has passed since I appeared before this Subcommittee and much has happened. I appreciate this opportunity to appear before you again and report on the progress achieved in Navy Research, Development, Test and Evaluation (RDT&E).

Today I will focus my discussion with you on specific issues. In particular I will address the course of action that we have taken to improve the overall Navy RDT&E function and process. I will also present information supporting our budget request and the status of a number of our important programs.

However, before doing this, I would like to introduce my colleagues who are joining me today.

With me are Mr. Richard L. Rumpf, my Principal Deputy; Vice Admiral Paul F. McCarthy, the Director, Research and Development Requirements, Test and Evaluation, and Major General Ray "M". Franklin, the Commanding General, Marine Corps Research, Development and Acquisition Command. Additionally, there are other members of my staff here to answer questions that may arise today.

I assumed the responsibility of ASN(R,E&S) in a complex and interesting period. Budget constraints and programmatic pressures were becoming greater. A long-sitting administration was entering its final year in office. Adding to the dynamics of the times, soon after my confirmation, an investigation centering on the Pentagon acquisition probe came into the public view. The uncertainty resulting from these events and their impact on morale was tremendous. Truly, this has been a challenging time!

Coming from a background in industry, I found that Navy's research and development program had many strengths and several weaknesses. Principal among its strengths were the quality, commitment and dedication of its scientific and technical people, the increasing professionalism of its program management personnel, the sound tradition and pride of Navy R&D and of the "Navy Labs", and the mutual respect and seriousness of purpose which characterizes top Navy military officers and their organization.

Weaknesses also existed which required attention and correction if Navy R&D was to be effective and to achieve its potential; particularly in an environment which required that funds be spent more judiciously. Principal among these weaknesses were the following:

- The program development process to deliver systems to the Fleet was cumbersome, confusing and extremely time consuming -- it took decades, not years for IOC!

- Certain Navy R&D functions, responsibility and accountability were fragmented and scattered.

- Communications with the other Services, the OSD and the Congress were inconsistent, incomplete and, at best, sporadic.

- R&D efforts were imbalanced toward new systems, new platforms and new weapons with inadequate attention given to improving, modernizing and upgrading proven, existing assets.

- Financial and cost reports were geared far more to toward answering questions of controllers and outside agencies than toward providing data to better manage the job.

- Navy R&D lacked a long-range plan without which there was poor justification for funding stability and strategic support.

- The Tech Base, extremely vital to our Navy future strength, was eroding rapidly.

- Navy labs and research centers increasingly were involved in engineering relating to today's problems rather than in development to meet tomorrow's challenges.

- Program managers were constrained and restricted from applying their sound and experienced judgment because of straight jacket policies and procedures, and the resulting fear of possible failure.

- Research and development focus was on "Platform" (ships, submarines, aircraft, guns, etc.) rather than on Missions" or "Battle Management" (ASW, Anti-Air, Strike, etc.). Consequently cross platform systems such as C3I and electronic warfare, which are essential in warfighting success, were receiving inadequate sponsorship and support.

- International cooperative R&D efforts were sporadic, inconsistent and lacked integrity, clear direction or strategic support. There was no plan to achieve ill-defined goals.

- Successful laboratory personnel and management enhancement programs, begun a decade ago as a "2-year experiment", remained as prototypes: programs vital to the Navy's ability to compete with industry in attracting and retaining skilled, innovative scientific and technical talent.

- Laboratory facilities and equipment, long a hallmark of Navy's world-wide scientific preeminence were obsolete, inefficient, decaying and rapidly falling behind those required to successfully pursue today's high-tech developments and to test such results. For example, over 73% of Navy's permanent buildings used for R&D were constructed well before 1960, and the planned rate of renovation or replacement indicate a continuing worsening situation.

- An adversarial relationship had developed between Navy and industry which adversely affected industry's interest in the Navy market; a relationship evolving from mistrust, cumbersome and ill-conceived procedures, suspicions, inexperience, ignorance and a lack of communications.

- A contracting/acquisition environment based more on legally-oriented, risk-adverse bureaucratic policies and procedures than on goals of achieving products of the highest quality, dependability and most attractive life cycle cost. Inflexible policies, instructions, directives, orders, and procedures coupled frequently with unrealistic, unilaterally-imposed scheduling goals and herky-jerky funding practices were leading to high direct costs, expensive schedule delays, cost growths, quality problems and lack of accountability.

Other problems affecting Navy R&D obviously required attention. However, some of these, such as the dearth of qualified, well motivated American scientific and technical university graduates and the eroding U.S. industrial base, are of national importance and require solutions far beyond the capability of the Navy. Neither do I mean to imply that those weaknesses outlined above are exclusively those of Navy nor that they have not been identified earlier by others. Indeed, several were addressed

early in this decade by the then Deputy Secretary of Defense, Frank Carlucci. Such problems also have been the subject of the Packard Commission Report and the Goldwater-Nichols legislation. Some of these weaknesses were alluded to much earlier in previous Administrations.

However, regardless of how long these problems have been around, indeed because of the increasingly adverse affect of their long lives, it is time that they be given Navy attention and be "run to ground".

During this past year we in Navy R&D, with the support of the Navy Secretariat, top uniformed Navy and Marine Corps officers and, as appropriate, OSD officials, have initiated several actions aimed at eliminating these weaknesses. These actions have included the following:

- Developed and proposed a new Navy R&D organization structure and function description, centralizing and streamlining Navy-wide RDT&E responsibilities within a single center in the Secretariat, thus providing improved, simplified civilian oversight and control, accountability and communications.

- Significant emphasis has been given in this new structure organizing by warfare mission or battle management area rather than by platform type. In particular, additional emphasis has been given to the ASW area; the first such warfare mission oriented approach that the Navy has taken.

- Drafted a long-term R&D plan for Navy, setting forth technical development and funding requirements for the next 15 years (20 years for facilities and equipment). This plan will provide for a Tech Base achieving minimum annual funding of $1 billion as soon as practicable, and an overall annual R&D funding growth of a minimum of 2.8%, excluding facilities and equipment.

- Initiated changes in the Navy vendor selection process for R&D work which incorporates criteria established by the Air Force, giving value to a vendor's past performance regarding quality, schedule performance, dependability and innovative contributions as well as attractive (not, necessarily, the <u>lowest</u>) price.

- Commenced periodic meetings with senior Congressional professional staff members to assure that they are informed as to "Where We Are", and "Where We're Going" regarding major programs, development plans and project problems. A principal goal which we have regarding these meetings is to focus attention on the need for stable program funding.

- Directed the development of a plan to refocus manufacturing/ processing technology development activities in Navy R&D similar to that established by the Air Force and industry; the initial effort being to enhance our RAMP Program.

- Initiated a "selling campaign" in Navy, OSD and the Congress to extend the successful "2-year" personnel management experiment to all other Navy laboratories and research centers.

- Completed the first phase of a two-phase activity aimed at reducing the time required by Navy to get a new, major system "on the deck" or "in the field" from decades to about 12 years, maximum. This is a Navy-wide effort with the contribution and support of "all hands" (Phase I results were presented to OSD).

- Identified that future Navy R&D will be a composite of funds provided by the Navy and OSD, with a significant amount coming from industry IR&D and the international community.

- Commenced a public awareness/relations program with the objective of encouraging talented, highly motivated young people to become scientists/engineers in the Navy R&D community. This program includes bylined articles in leading publications, conferences and speeches both in the U.S. and abroad, broadened Navy-industry personnel exchange programs and their outreach efforts.

- Initiated a Navy international cooperative R&D Plan for the long-term, the first step of which is to identify with our allies the technological "edges" or advantage which each country possesses as well as their security limits. We also are defining the present, general international cooperation goals (i.e., 10% of Navy's effort by 1994; 25% by 2004) in more precise, technologically-focused terms.

- Completed the first round of nation-wide meetings with industry leaders and university officials with the goal of encouraging their unilateral participation in Navy-oriented research and development activities. Ten meetings have been conducted with about 180 companies and 80 universities to provide information on the Navy's strategic direction, our technology interests, long-term business opportunities with Navy, and changes we are considering in our contracting/ business practices to make Navy a more interesting, attractive market.

- Supported the successful continuation of the Navy Industrial Fund (NIF) program concerning the Navy laboratories and research centers, thus providing modest means to help restore facilities to their post-World War II excellence.

- Established guidelines for Navy R&D which should assure that a significant portion of future Navy R&D expenditures are used to improve and upgrade existing systems, platforms and weapons, including such steps as androgynous designs, modularity, etc., to reduce the variety of assets. The initial guideline is 16% of the total, annual Navy R&D budget by 1992.

- Commenced periodic meetings with the Assistant Secretaries of the Air Force and Army who are responsible for R&D to better coordinate inter-service development programs and efforts, and to obtain ideas as to how Navy can better do its job.

- Brought top Navy and Marine Corps officers and officials into the R&D planning and decision process to increase their understanding, obtain their ideas and to strengthen their sponsorship and support on key issues.

- Initiated changes in the R&D acquisition process to make it more efficient and less costly, including steps toward the elimination of the Best and Final Offers (BAFOs), protection of proprietary property rights and a better understanding--a more open approach--to understanding Navy's requirements and specifications; all of which should result in greater innovative contributions by industry. These changes should reduce vendor costs, translating formerly unproductive resources into IR&D applications.

You will notice that, while several steps are underway to correct problems, few of these actions yet are completed. However, they are sufficiently well along and an adequate support base of people is in place to ensure that these actions can be completed in the foreseeable future.

The Realities of a Constrained Budget

The resources provided in the past for Navy RDT&E have been well spent. The Navy of the near future will center on platforms that utilize technology currently under development including:

- AEGIS Cruisers and ARLEIGH BURKE Destroyers with SPY 1B/D radars
- SSN-21 submarines with advanced quieting
- A-12 aircraft with reduced signatures
- selected modernization of existing forces

The challenge for the future is preparing for the Navy of the 21st century by:

- ensuring that we continue the lead in key technologies
- streamlining the bureaucratic process to introduce new technology to the fleet more quickly
- working effectively and efficiently within a constrained budget environment

However, we must still face the realities of a stringent budget environment which started four years ago. As such, a number of programs have been cancelled or deferred for FY 1990 including:

- Advanced Sea Mine
- Integrated Communication System/Shipboard Communication Area Network (ICS SCAN)
- A-6 Remanufacturing (A-6G)
- Vertical Launch ASW Rocket
- Marine Corps Hyper-Velocity Missile

Lastly, there are a small number of programs that will start, including:

- Anti-Satellite Program (ASAT)
- EA-6B Aircraft Improvement Program
- Advanced Interdiction Weapons System
- Advanced Warhead Development for Mk-50 Torpedo

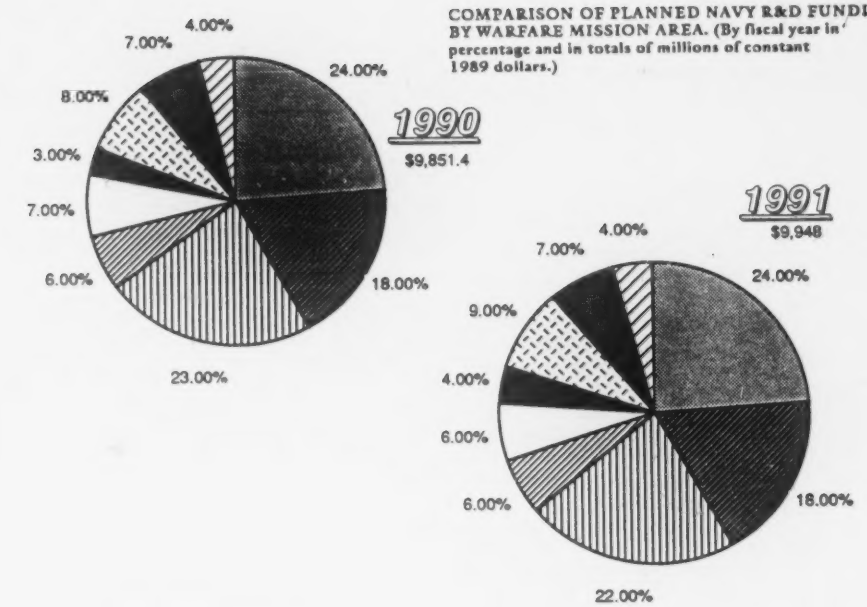
Our budget request for FY 1990* is $10,184 million and for FY 1991* it is $9,636 million. As shown in the Exhibit, funds are spent in a number of battle management and support areas. In FY 1990/1991 a majority of funds, about 24%, are devoted to Anti-Submarine Warfare programs. Our Air/Anti-Air Warfare Programs utilize about 18% of our resources while our Strike/Surface initiatives use about 23%. We devote about 7% of the funds for our Strategic programs and 6% for Expeditionary Force programs. Lastly, about 12% is spent on cross mission areas and classified efforts. Looking to the future, by the year 2005 while R&D funding increases in all areas, Cross Mission and Strategic realize considerably greater increases in funding; largely at the expense of the Surface/Strike area.

In addition to the trends in our future 15 year R&D operating plan, we look for significant improvement in our facilities and equipment for our laboratories and test assets.

*In Five-Year Defense Program (FYDP) dollars

EXHIBIT A

COMPARISON OF PLANNED NAVY R&D FUNDING BY WARFARE MISSION AREA. (By fiscal year in percentage and in totals of millions of constant 1989 dollars.)



NOTE: The areas of the circles indicate the approximate difference in dollar expenditure between years.

CHALLENGE AND ACTIONS

Our challenge remains - we must maintain the high capabilities of today's Fleet while looking well over the horizon toward the development of our future Fleet. This requires innovative management of constrained resources. We must continue the balance among requirements, resources and programs. The concept of being able to "turn on" and "turn off" technology to meet a new threat must be considered carefully. Funding stability is vital. Avoiding variable program funding prevents false starts, delays, terminations and costly stretch-outs. The Navy R&D Program for FY 1990/1991 carefully considers priorities and supports efforts vital to the efficient execution of the naval mission:

- A revitalized Tech Base program. The future Fleet will develop around ideas and inventions molded from our laboratory, university and industry infrastructure.

- ASW efforts including weapons systems, sensors, platforms, and the fusion of warfare information. Upgrades in our SSN-688 class attack submarines, significant progress in lead ship procurement of the more capable SSN-21 SEAWOLF class, and development of even more advanced submarine technology.

- STRIKE systems with across the board impacts from the design of the next generation carrier capable medium--attack bomber (A-12) to the success of the PIONEER RPV System that supports the Fleet. These are in addition to Standard Missile - 2 Block IV program, AEGIS weapon systems upgrades and technology efforts such as integrated electric drive for ships.

- The successful TRIDENT II D-5 strategic missile system and cruise missiles such as the TOMAHAWK.

- Improved C3I/EW systems are the "glue" that enables us to use warfare information in making appropriate decisions concerning force movements and directing weapons to targets or preventing enemy action against our platforms. This is of particular importance to the naval forces, remembering that the oceans comprise three-fourths of the earth's surface.

- U.S. Marine Corps, Expeditionary Force programs that provide more effective weapons for a lighter, more mobile force.

- International armaments cooperation efforts that (a) reduce the cost of developing weapons systems through sharing of R&D cost burden, (b) to ensure that common requirements are met as weapon costs increase, (c) maintain Allied industrial base technologic/economic equivalency, and (d) compensate for decreases in Foreign Military Sales.

- Interservice development activities which result in lower initial costs and subsequent logistic support expenses.

Lastly, the strength of Navy R&D lies in the excellence of our technical people. The scientists and engineers working at our laboratories and centers are at a significant compensation disadvantage compared to their industrial and university counterparts. Our managers need the flexibility to identify and rapidly reward their most talented and productive people before their needs drive them to other activities. The action taken by the Navy with the help of Congress to reduce this problem via the "China Lake Experimental Personnel System" has been an excellent first step in providing appropriate assistance. However, this has been a band-aid approach. Even though the concept has been expanded in geographic scope and extended from two years to ten years it is believed that even more needs to be done. Clearly, we must work together to make this experiment an established policy for all service laboratories.

CONCLUSION

In the FY 1990/1991 timeframe and beyond we see increased competition for scarce resources. We have noted the specific actions that the Navy has taken to focus on planning (both short and long range) that will help us to build a superior and effective future Fleet.

However, our work is not done. It is essential that the strong partnership that has been established between the Navy and Congress be maintained. We in Navy RDT&E will work continuously to justify your support which is essential to the success of future Navy and National goals.

21-582 O—89——11

ANTISUBMARINE WARFARE (ASW) R&D

Mr. MURTHA. The House Armed Services Committee and the Defense Science Board severely criticized the platform-specific organization of the Navy as it relates to antisubmarine warfare R&D in particular. What has the Navy done to meet the directions of the SECDEF's February 17, 1988 letter requiring that all R&D ASW funding be provided to a central program sponsor?

Mr. FAUGHT. We are well along the way toward accomplishing this. Admiral Wolkensdorfer has just reported from OPTEVFOR to take charge as Director ASW Development. It has taken us longer than it should have to reach this point. He will report directly to me via my principal deputy for this area and will be responsible for bringing together all facets of ASW R&D and for working together with the Office of the Chief of Naval Operations in interfacing with DARPA. He will be a fundamental player in the transition of advanced submarine technology from DARPA to the Navy, which will commence next year. He just came onboard, so we haven't got a total plan developed yet, but that is going to be his initial assignment.

Mr. MURTHA. It looks like to us that there is only $200 million in these programs, which is a small percentage of the overall RDT&E.

What does it look like?

Admiral WOLKENSDORFER. I think that this process between full-scale development and the tech base, if you will, is a cyclic one. We are in the process now of funding the SSN-21, for example, but I would anticipate that in the ensuing years, that that ratio will turn around and that we will indeed improve the tech-base side.

Mr. MURTHA. When will that occur?

Admiral WOLKENSDORFER. I would think we are still two to three years from that in terms of a turnaround, but we are now in the process of developing a plan to look at this.

Mr. MURTHA. Have you looked at the five-year plan, Admiral?

Admiral WOLKENSDORFER. Yes, I have.

Mr. MURTHA. We don't see that in the five-year plan.

Mr. FAUGHT. Mr. Chairman, I think we have really two parts to this plan. We have the Navy line and we also have the DARPA DOD activity, and Admiral McCarthy has been looking at this. I would like to have him tell you what the evolution has been there.

Admiral MCCARTHY. Let me talk about Admiral Wolkensdorfer's control of the budget. He has control of the 6.2 and 6.3 R&D funding through Secretary Faught, which is provided to CNR. 6.1 funding is used for university research and since his efforts may easily draw upon that, he has good connectivity to Admiral Wilson, to OPNAV through me and the CNO. Both the CNO and the Secretary have been strong in supporting Dan.

Admiral Wolkensdorfer has interfaced with all the coordinators in the systems commands. We are reviewing their inputs and we think we have the basis for a good plan on where we need to go. We have a lot of efforts going and we think that the organization that we are putting together now is the appropriate organization to do the job.

Mr. MURTHA. The Secretary of Defense called for a national level organization in ASW. Is that what we are talking about here?

Admiral McCARTHY. We have a Navy organization that we feel very comfortable with and we are very confident that it can handle the ASW situation in the Navy.

Mr. MURTHA. I thought you took the lead in it. It was a national effort, obviously. I would think the Navy would take the lead.

Admiral McCARTHY. That is correct.

Mr. MURTHA. So where are we then?

Mr. FAUGHT. To the extent there is a national program and will be a national program, Navy will take the lead and Dan will be responsible for that.

The DARPA involvement, as you probably recall, began last year and that transition will be concluded next year and the Navy will be totally responsible.

It is a national program, but Navy is responsible for it.

Mr. MURTHA. Are you getting support from these other independent agencies?

Admiral McCARTHY. We are working very well with the DARPA organization and with our own activity, NAVSEA 92R. Rear Admiral Tom Evans is heading up that organization and he is working very closely with Dan. I might just say that the two-year program in the FYDP is just the beginning of this effort. It isn't certainly the long-range amount of funding that any of us would like, but it does get us started and the DARPA funds will certainly add to that. Speaking very frankly, I think there is a view that perhaps the Navy has for too long a time concentrated on the SSN–688 and the SSN–21 and has not moved off smartly, if you will, into new developments. I think that this view is wrong. We are doing a great deal in preliminary R&D work in future submarine technology and we have been working very closely with DARPA in all these efforts.

Mr. MURTHA. Well, I have to say that after being aboard the submarine for 12 hours, that doesn't make me an expert in anti-submarine warfare, but these people are confident they still have a lead even though the Soviets have improved.

Talking to the people that run the ASW effort in the ship itself, who have been in the Navy anywhere from 12 to 19 years, they believe there has been substantial improvement in the quieting of the Soviet submarine ——— that we still have a substantial lead.

We don't want to lose that lead, and apparently the Secretary of Defense believes there should be more of an effort. You are saying that the Navy has put forth an effort, but they are saying you need to lead the national effort.

I am not clear what you are doing differently than you were doing before.

Mr. FAUGHT. Let me give you some examples.

You brought out one challenge, the quieting of the Soviet assets. One of the directions this has led us, and that we have been working on for the last two or three years, is to improve our active versus passive sonar efforts. This is well underway.

Another direction is development of the LRAACA, which takes the place of our older ASW aircraft. This contract has been let. The LRAACA is going to be a vast improvement over the present P–3. In antisubmarine warfare, we are talking about more than just the platform itself.

We have a number of special access programs which relate to a totally different approach to ———. This is to be developed, but the IOCs for these types of assets are going to be some distance out.

There are many more efforts included under the term ASW than the platforms, although, the SSN–21 will be our initial thrust into the platform area of the new technology.

I think that, given the state of the technology, and given the assessment of how we see the threat has developed and is developing, I feel we are fairly comfortably along with what we have set out to do as a national effort.

Admiral McCarthy. One of the questions that comes up is; who is involved in this national effort other than the Navy?

We in the Navy, including OPNAV, the Secretariat, and the Office of Naval Research, are involved. We are closely linked with the CIA. We have a very close relationship with DARPA.

We are well connected with groups such as the oceanographers and environmentalists. So what you are seeing is that there is a good, strong, closed loop, and there is a lot of dedication towards that ASW effort.

Mr. Murtha. Well, the House Armed Services Commitee seems to feel there is an organizational problem here. You think you are keeping ahead. We want to make sure we don't lose this edge we have.

This is obviously the most critical of all our national security problems because it is the most important leg of the triad, in my estimation. It is the ultimate deterrent.

There are people that say that it is really—that the Navy is just not going at this wholeheartedly and they haven't moved quickly. This committee just wants to make sure that these criticisms which have been leveled by the Secretary himself are being followed because it is such a critical area of our national defense.

Mr. Faught. If I could respond, Mr. Chairman—there is an evolution in any organization and I think the more settled in, if you will, an organization is, the more difficult change is to effect.

The Navy long has been a platform-oriented structure. It still is platform-oriented, but we are moving as rapidly as we can, both in the planning and management of requirements as well as the technology transfer, to a warfare mission-type organization from the platform area, ASW is the first venture in that direction.

The consolidated ASW technology transition function is the first of these activities. It is new. It is going to require a change of mentality as well as structure, but Dan is going to be the point man on this activity and I think we have a very good person to do that.

Mr. Murtha. Is that enough rank to pull this thing together?

Mr. Faught. That is a good question.

We think it is at this time, I think we can give you a further report as we develop concerning whatever problems we might encounter. We are just leading off first base a little bit in this, and we are going to have to see how it develops.

Mr. Murtha. Mr. McDade?

ASW ARCHITECTURE PLANNING

Mr. McDade. Thank you, Mr. Chairman.

I would like to follow on a bit with the questioning that the chairman has initiated and which the Armed Services Committee and others have talked about. One is ASW architecture.

The Armed Services report discussed the need for an entirely new and aggressive architecture for coping with this immensely serious development.

Our committee is aware of previous attempts within the Navy to develop an approved "ASW Architecture," but such a document never made it through the Navy, and we are advised that the reason for that was a lot of infighting between the platform sponsors and a host of other things that are institutional in nature. Given the failure to develop that, how will the Navy do things differently this time around to develop an ASW architecture? What are the plans that are going to be different this time?

Mr. FAUGHT. The plans are going to be coming together shortly and Admiral Wolkensdorfer will be developing those with Vice Admiral, McCarthy and myself. I am only talking about technology transfer now.

I think we have our organization concept developed to the point where it will have high enough visibility which wasn't the case before.

Mr. MCDADE. There is a lot more visibility over here than there has been in the past.

Mr. FAUGHT. We welcome that.

Mr. MCDADE. We hope that might help you to come to grips with what you needed to do.

Mr. FAUGHT. I would like to suggest that, as soon as we get our ducks in a row about the plan, that we come back to you and perhaps solicit your further attention and support.

It is one of those things that all of us recognize as a cornerstone of our future defense effort.

Now, we have, as you mentioned, the institutional challenge. That also is occurring at the same time we are having some budget constraints.

There are other areas which require support and financing, our surface strike area and others.

Mr. MCDADE. A follow-up question on that.

What organization within the Navy should be tasked to carry out such an effort and how would the top-level commitment be obtained such that this time the project would result in a meaningful analysis?

Mr. FAUGHT. Let me go back and look at the whole picture.

First of all, we have to talk about requirements and that comes before we get involved in R&D, of course.

Now, I would like—and I am not passing the buck here. But since Admiral McCarthy is responsible for the requirements transition in R&D, I would like him to field that.

Obviously, that area is in the Office of Chief of the Naval Operations.

Admiral MCCARTHY. One of the initial questions that came up was, has the Navy changed the architecture? And the answer is yes.

It has been an evolutionary change.

In the seventies, we were hooked on doing passive ASW. That was the strong suit of the United States Navy.

After watching the Victor III submarine come along, we recognized that there had been a change in the Russian philosophy and that they had discovered quieting. By 1984, we had laid out a different arrangement to do ASW. We are now using the deep sound channel as well as direct path acoustics. We have run a number of critical at sea experiments with critical systems and environmental programs.

We know that we can come up with ———.

We know that ——— and how you use it will be an important game plan in the future and we are bringing all those things together in the ASW Master Plan.

Mr. McDade. What organization would you describe as bringing forth all these things?

Admiral McCarthy. The organization that is doing that from the requirements aspect is OP–07, Vice Admiral Miller. He is laying these challenges on me, saying "Fix these things. Find me a technical answer to it."

We are getting together with the research community and the labs and people in industry and trying to pull these answers together.

We have a set number of experiments that have been going on over a period of three or four years and these things are starting to come to fruition.

We think that our game plan that has transpired from 1984 until now is beginning to pay off.

Mr. McDade. Let me quote what the Armed Services Committee says. It says:

> The Navy establishment, like many organizations of comparable size and age, is burdened with internal vested and sometimes conflicting interests that encumber innovation and execution on the scale required here.

They are arguing that dramatic new initiatives are essential if the problem is to be solved in time to cope with what they perceive to be the threat.

As you describe it, it sounds like it is business as usual. If we look historically, business as usual is good, but the problem is whether or not that has led to a complacency so when you describe what you were describing to us, it sounded that way. Where are the new innovations?

Admiral McCarthy. You are seeing a marked shift from how we have done business in the past by our branching out of the passive only area.

We think there are technologies and frequencies that can be exploited ———. We have a number of compartmented programs looking into that. We are doing more in using ———. One of the problems is that you have to fold in a lot of things in order to make ASW successful.

You have to use a multi-force structure so we recognized that communications and the data fusion must also be a part of this effort.

I don't think we had that type of insight in the early eighties. I think we now have developed that type of insight and have de-

signed the experiments that will let us develop the right type of products by the time the mid-nineties come around.

Mr. McDade. Some of the concern is that those items that represent modernizations that you reflect represent a piece of hardware here and a piece of hardware there and the argument of the Armed Services Committee and the panel has been that that is not sufficient, that what the Navy needs is a much broader approach to the entire problem rather than trying to deal with a fix here and a fix there.

Would you comment on that, Admiral?

Admiral McCarthy. We think that with the new organization that we have——

Mr. McDade. What is the new organization?

Admiral McCarthy. The organization we have established in the Secretariat under Secretary Faught and under me starts with Admiral Wolkensdorfer. We think that he can ride herd on all the technical developments that are coming along to ensure that we have a direct input into the laboratories and into industry that will bring these technologies forward.

We think that with his insight he can comment on the plans that OPNAV develops to make sure we are going with the latest technology.

We have standing committees, Team Alpha for example, that look at——

Mr. McDade. Can I back up a second?

I hear what you are saying and we come back to the fact that it is a two-star that is going to be given this task of kind of revolutionizing the crown jewels of the Nation's defense.

Mr. Faught. He is a two-star. Admiral McCarthy is a three-star. I am equivalent to a four-star, and I don't know what the Secretary of the Navy is, but if necessary, if push comes to shove, it is going to go from Dan to Paul to me to Will or to whomever, and if we have a major conflict between the Secretary and the CNO, I think the Secretary of the Navy will be the one carrying the ball.

There is this institutional situation and it is going to take time to modify that.

We have started an R&D initiative which you might have noticed in the material. We are reorganizing our R&D effort by battle management organization rather than platform. This is new in the Navy.

ASW, under Admiral Wolkensdorfer, will be the first major part of that reorganization where you bring together a warfare area for example. We have concentrated this morning thus far on what happens with Soviet increased quieting, but we have got increased quieting required in our own platforms and weapons, torpedos and submarines ——— in our own torpedos.

There are probably a dozen facets of this which he is going to be bringing together and if he has trouble in his requirements or funding from the other side of the house, we will force it through the Secretariat.

Mr. McDade. Are you going to have a planned meeting schedule to discuss issues? Lots of times we see a group set up and then the communication doesn't work adequately. Do you have any plans?

Mr. FAUGHT. We have the genesis of a plan for that among ourselves, DARPA, and Rear Admiral Tom Evans on the OPNAV side. That will be the nucleus of such a committee you are recommending.

Mr. MCDADE. And you will have regularly scheduled meetings where you sit down and discuss which side of the question you are coming from and funding needs?

Mr. FAUGHT. We intend to and we have the agencies helping us with an objective intelligence assessment of what is happening.

Mr. MCDADE. Thank you.

Thank you, Mr. Chairman.

Mr. MURTHA. One of the things we are always concerned about is the Soviets seem to be able to overcome problems by either stealing secrets or whatever much quicker than we anticipate.

You have done a great job, no question about it. For instance, on this submarine, we found new equipment in a 20 year old submarine, so you had the most up-to-date equipment that you have been working on deployed to the fleet and, consequently, that submarine is able to do its job out there in the middle of nowhere. We appreciate that. But on the other hand, we cannot underestimate how quickly they overcome these difficulties, because we have underestimated them in every way in dealing with these kinds of problems.

Mr. Dicks?

ASW ADVISORY BOARD

Mr. DICKS. Thank you, Mr. Chairman.

The House Armed Services Committee panel recommended an OSD-level ASW Advisory Board.

What are your views on this recommendation?

Mr. FAUGHT. Well, I have no conflict with the idea of an advisory board. I think we can certainly use all the constructive advice we can muster. We are getting a great deal of advice here. We are the center for assimilating this advice from the intelligence community and other places.

I really feel that—and this may come across as rather a parochial comment, but I really feel that the mission requirements, the oversight, the understanding of what we have to come up with and what is possible is a Navy function.

I think we should be held responsible and accountable for what we have been given to do, and I think that type of oversight would better be placed with the Navy.

We are endeavoring, as the Congressman suggested, to bring together the various disparate groups now to carry out that function.

ADVANCED SUBMARINE TECHNOLOGIES

Mr. DICKS. As you know, the House Armed Services Committee, over the last several years, has recommended funding for the DARPA program because of their concern about the lethargic approach of the Navy to this issue, and I have had serious reservations about whether that was advisable or not.

But I must say, the question really is going to be, is the Navy truly reacting to this both in terms of organizational structure, and more importantly, I think resources.

I read their report. They talk about the problems with passive sonar, they start talking about the fact that our submarines will basically not be able to perform this ASW mission.

ASW FUNDING

Now, according to the Navy budget documents, only $525 million is budgeted in fiscal year 1990 for all ASW work prior to full-scale development. More than 75 percent of the Navy's planned funding is for systems already in full-scale development, yet, according to the Navy and congressional studies, serious ASW deficiencies will remain after these systems are fielded.

In the words of the House Armed Services Committee, "dramatic new initiatives are essential . . . We believe that the Navy must, in effect, start over with new approaches to ASW."

What is in this budget for this kind of work? In your statement, Mr. Secretary, this gets one sentence and it is kind of referenced at the very back of your statement. It doesn't sound to me like a high priority.

Mr. FAUGHT. ASW is extremely high priority to us. You know, we are now pulling together a plan, and I know that you probably heard of people pulling together plans for decades around here, but until we get an integrated plan put together, it is very difficult to convince other people what kind of funding is required.

Speaking of ASW in total, it is an interesting comment. I am talking about within Navy right now. We have got to balance, which we are in the process of doing now, the various assets of what we are talking about. For example, the initial DARPA effort, which I think was commendable and Congress supported, was focused largely on the platform and of the $100 million, approximately 80 percent was going to hull and mechanical and the other approximately 20 percent was the high-tech area of sensors, et cetera.

That is the area where we really need the new technology.

We are moving from the ———. We are moving to a new aircraft. There are a lot of cross-mission applications which are being funded which relate to ASW as surely as they relate to our other areas.

Admiral MCCARTHY. I think that if you look at the R&D account, which is basically about a $10 billion account, roughly, of that account, there is about 25 percent that is devoted to ASW.

If you back out some of the major weapon systems which are very important and part of the ASW game plan, you probably come down to the tech base of $1 billion dollars for ten percent of the account.

ASW funding, as far as the Navy is concerned, has been growing over the last three years. We have had a significant growth in that account. As far as areas that are new and different, for example the ——— area is very important.

Mr. DICKS. How much are we spending on that?

Admiral MCCARTHY. I don't have a figure, but I can supply that for the record.

[The information follows:]

LIST OF NAVY ASW PROGRAMS

BUDGET ACTIVITY ELEMENT	TITLE	FY-89	FY-90	FY-91
TECHNOLOGY BASE (BA1)				
0601153N	DEFENSE RESEARCH SCIENCES *	(94,000)	(93,000)	(104,000)
0602233N	MISSION SUPPORT TECHNOLOGY	31,140	31,781	33,398
0602234N	SYSTEMS SUPPORT TECHNOLOGY	60,819	63,593	66,647
0602314N	ANTI-SUBMARINE WARFARE TECH	100,592	95,986	101,911
0602315N	MINE & SPECIAL WARFARE TECH	15,370	16,556	17,439
0602323N	SUBMARINE TECHNOLOGY	14,503	15,334	16,169
0602324N	NUCLEAR PROPULSION	44,423	14,036	14,353
0602435N	OCEAN & ATMOSPHERIC SUPP TECH	28,854	29,458	30,897
0602936N	INDEPENDENT EXPLORATORY DEV	15,788	16,407	17,289
	* PORTION WHICH IS SUPPORTIVE OF ASW R&D (NON-ADDITIVE) TOTAL	318,489	283,151	298,103
ADVANCED TECHNOLOGY DEVELOPMENT (BA2)				
0603747N	ADVANCED ASW TECHNOLOGY	2,420	4,603	5,021
0603792N	ADV TECHNOLOGY TRANSITION	56,728	62,559	51,396
	TOTAL	59,148	67,162	56,417
STRATEGIC PROGRAMS (BA3)				
0605856N	STRATEGIC TECHNICAL SUPPORT			
	TOTAL	3,146	6,234	6,542
TACTICAL PROGRAMS (BA4)				
0204311N	UNDERSEA SURVEILLANCE SYS	40,488	48,069	50,927
0204313N	SURTASS	4,390	5,546	7,550
0205620N	ASW COMBAT SYSTEMS INTEGRATION	14,014	16,159	19,018
0603207N	AIR/OCEAN TACTICAL APPLICATIONS	7,711	11,166	12,314
0603228N	CV ASW MODULE	957	3,505	3,518
0603254N	AIR ANTI-SUBMARINE WARFARE	8,841	11,035	11,002
0603260N	ABN MINE COUNTERMEASURES	12,055	13,027	16,558
0603502N	SURFACE MINE COUNTERMEASURES	15,491	14,306	20,595
0603504N	ADVANCED SUBMARINE ASW DEV	12,233	16,322	28,625
0603506N	SURFACE SHIP TORPEDO DEFENSE	33,682	51,515	52,984
0603522N	SUB ARCTIC WARFARE SUPPORT EQUIP	3,347	2,902	2,813
0603528N	NON ACOUSTIC ASW	15,601	15,994	17,055
0603529N	ADVANCED ASW TARGETS	15,002	25,307	12,143
0603553N	SURFACE ASW	71,917	55,855	53,992
0603561N	ADVANCED SUBMARINE SYSTEM DEV	N/A	N/A	37,203
0603562N	SUBMARINE TACTICAL WARFARE SYS	6,131	7,483	7,186
0603582N	COMBAT SYSTEMS INTEGRATION	10,244	8,989	8,993
0603601N	MINE DEVELOPMENT	1,493	4,345	4,964
0603610N	ADVANCED WARHEAD DEVELOPMEN	500	4,720	4,959
0603634N	TACTICAL NUCLEAR DEV (NDSB)	2,021	10,325	15,026
0603691N	MK-48 ADCAP	27,463	44,902	59,150
0603702N	OCEAN ENGINEERING SYSTEM DEV	1,832	2,185	2,212
0603704N	ASW OCEANOGRAPHY	9,203	9,408	9,457

0603708N	ASW SIGNAL PROCESSING	15,425	21,083	25,818
0603763N	WARFARE SYS ARCHITECTURE AND ENG	9,987	11,783	12,429
0603785N	ASW ENVIRONMENTAL ACOUSTIC SUP	16,589	16,816	16,985
0604212N	LAMPS	9,872	7,274	21,387
0604218N	AIR/OCEAN EQUIPMENT ENG	2,036	2,467	2,777
0604219N	AIRBORNE ASW DEVELOPMENTS	0	8,105	8,605
0604221N	P-3 MODERNIZATION PROGRAM	200,245	357,147	277,353
0604261N	ACOUSTIC SEARCH SENSORS	42,739	49,833	54,565
0604309N	SEA LANCE	79,327	127,832	139,890
0604370N	SSN-688 CLASS VERT LAUNCH SYS	14,009	8,954	12,352
0604502N	SUBMARINE COMMUNICATIONS	3,956	8,360	12,045
0604503N	SUBMARINE SONAR DEVELOPMENT	35,479	27,179	43,321
0604507N	EMSP	50,266	28,215	20,037
0604515N	SUBMARINE SUPPORT EQUIPMENT	15,341	31,379	36,506
0604524N	SUBMARINE COMBAT SYSTEM	371,329	361,138	389,061
0604561N	SSN-21 DEVELOPMENT	188,013	191,969	178,209
0604562N	SUBMARINE TACTICAL WARFARE SYS	43,375	77,341	73,702
0604601N	MINE DEVELOPMENT	10,184	11,663	12,110
0604603N	UNGUIDED CONV AIR LAUNCH WEAPON	2,005	13,010	13,905
0604610N	ADV LIGHT WEIGHT TORPEDO (ENG)	136,393	63,630	11,409
0604704N	ASW OCEANOGRAPHIC EQUIPMENT	1,226	1,265	1,347
0604713N	SURFACE ASW SYS IMPROVEMENT	---	72,142	117,882
0604715N	SURFACE WARFARE TRAINING DEV	18,618	17,687	12,160
0604784N	FIXED DISTRIBUTED SYSTEM	103,859	160,157	204,558
0605853N	MANGAGEMENT AND TECH SUPPORT	6,650	9,184	9,351
	TOTAL	1,691,539	2,068,678	2,166,008

INTELLIGENCE AND COMMUNICATIONS (BA5)

0604231N	TACTICAL COMMAND SYSTEMS	25,873	47,475	42,191
0604514N	NAVIGATION SYSTEMS	0	5,700	5,216
	TOTAL	25,873	53,175	47,407

DEFENSE WIDE MISSION SUPPORT (BA6)

0605857N	INTERNAT. RES, DEV, TEST/EVAL	3,134	7,546	8,228
0605864N	TEST AND EVAL SUPPORT	323,040	346,913	369,703
	TOTAL	326,174	354,459	377,931

OTHER

INCLUDES COMPARTMENTED AND MGMT/SPT				
	TOTAL	287,000	352,600	377,000
	GRAND TOTALS	2,711,369	3,185,459	3,329,406

Admiral MCCARTHY. There are other areas in the compartmented program area.

Mr. DICKS. Does Admiral Wolkensdorfer know?

Admiral WOLKENSDORFER. Not precisely; no, sir.

Mr. DICKS. What are you requesting in this budget for that?

Admiral WOLKENSDORFER. It is on the order of $25 million.

Mr. DICKS. That is for ——— $25 million.

Go ahead. What else are we doing?

Admiral MCCARTHY. There are areas in the compartmented programs that we have been funding.

Mr. DICKS. For example?

Admiral MCCARTHY. You would have to go to a higher classification. That effort is over $150 million on an annual basis.

Mr. DICKS. Over $100 million?

Admiral MCCARTHY. Yes, sir; well over $100 million.

Mr. DICKS. Mr. Chairman, I would hope that we could go to a higher level at some point to hear——

Mr. MURTHA. There will be special program hearings tomorrow. We will have them back because either DARPA or the Navy is going to get the money and we want the Navy to get the money.

So when you get your plan together before we go to mark-up, we will have you back and have that hearing at a higher level.

Mr. DICKS. So you have your highly secure programs that are looking at new approaches to ASW submarine detection?

Admiral MCCARTHY. Yes, sir.

Mr. DICKS. At $25 million in your ———.

You mentioned, I think, improvements in passive and going to ———. How much is being done there?

Admiral MCCARTHY. I can supply that for the record.

It is in the ——— area, areas that we have not looked at in passive before, new and different signatures that we have discovered.

[The information follows:]

Although Soviet quieting measures will significantly diminish our ability to detect and track enemy submarines using traditional passive ——— acoustics, substantial promise still remains in selected passive approaches. Over the past two years, a concerted effort has been mounted to identify and describe ——— of submarine radiated acoustic energy. For example, "Speed Related Components" associated with fluid flow, hull dynamic response, and operational variations have been studied and categorized ———. The Naval Technical Intelligence Center has published a taxonomy of these signals and ———.

Mr. DICKS. Do you agree with the House Armed Services Committee panel that this vast improvement in Soviet quieting ———?

Admiral MCCARTHY. It has had a dramatic change on how we do business.

Does it render it totally useless? The answer is no. There are still areas in passive that we think are important to exploit, but we think by far the way to go in the future is the ——— area.

Mr. DICKS. Obviously we are not seeing the Soviets retrofitting their older submarines.

Are we talking basically here about the *Akula*? Is this the one we have measured with intelligence and this is the area we are worried about——

Mr. FAUGHT. The *Victor* and the *Akula*.

Admiral MCCARTHY. We have seen an overall awareness of the Soviets in quieting and the *Victor* III really brought this message

home to us. They now understand how to quiet things. They didn't care about it in the past. They felt they wanted to go fast and escape and, with a nuclear submarine, you become very noisy.

Mr. MURTHA. The troops said this was true when they first launched the ships in the first six months or so and then they get noisy. Is that because of discipline or does the system itself start to break down?

Mr. FAUGHT. I would have to defer from an operating standpoint, but I know that earlier this year we have had two examples or three examples ——— and that I feel is sufficient evidence that we have quite a bit to do in exactly what Mr. Dicks is talking about.

Mr. DICKS. It worries me. As I understand our system, every part of it relies on passive detection, your P-3s, your SOSUS system, SURTASS with the TAGOS ships, the submarines—what we are talking about here, if this is true, is the whole system we have built up is basically not going to be very useful.

Mr. FAUGHT. That is true, but I think the question becomes one of timing. As you pointed out, you asked about the *Akula* and we also mentioned the *Victor*. They have got quite a distance to go before those types of vessels dominate their submarine fleet, so during that period of time ———. I am not saying that we are where we should be in terms of the assets we have employed, but I believe ——— and I think it is fairly sound ——— but is fairly well supported.

ADVANCED SUBMARINE TECHOLOGIES

Mr. DICKS. Let's just get it out on the table. I have talked to the House Armed Services Committee. They are not going to buy the Administration's plan to kill DARPA funding.

The HASC is going to reauthorize money for DARPA and their recommendation is that we have a complementary program; the Navy and DARPA go ahead and get the CIA out of this because they shouldn't be involved in the first place. They should be out there working on intelligence. I think that is correct. The basis for the HASC viewpoint goes to the fundamental question of how much money are you willing to put into this?

The Soviets are deploying these submarines and we are sitting here arguing—trying to figure out what we are going to do. That is what has gotten people nervous here. There are certain areas these submarines are operating and we can't find them. I have always been very doubtful in my own mind that DARPA was the right place to go for help here. I hoped we could get enough sense of urgency in the Navy and a high enough level of commitment and enough resources into the various avenues so that we wouldn't have to fund the DARPA effort.

SOVIET SUBMARINE CAPABILITIES

Mr. MURTHA. Put this in perspective for us because the people in the fleet obviously may not have come in contact with these particular submarines. They still feel confident they can detect the submarines long before anybody can detect them.

Where are we with this overall detection and how many submarines do the Soviets have that we can't detect and under what circumstances?

Mr. FAUGHT. I think the people you were with, Mr. Chairman, over the weekend—they are correct that we still have a significant edge in our detection capability over the Soviets.

I think also they are correct to agree that the ——— time. That does not again say that their equipment isn't getting better. As soon as they pick up the ———.

Mr. MURTHA. So this is not a generic problem in the ship. This is a ——— because is was not clear to me that the ship didn't develop noises that they couldn't control.

Mr. FAUGHT. To our best ———. The crew is not as well trained as ours and ——— time. I think we are dealing with an adversary or enemy of around 200 attack submarines.

A significant portion of that is still in the diesel area, where I think we have only these diesels left.

I am as concerned about how fast they are producing, as much as anybody in this room. They are producing submarines at an increasing rate.

Last year ——— and they obviously are putting more of their assets in the submarine/antisubmarine area.

I don't know how many *Victor* I, *Victor* II's, *Victor* III, *Akula* that they have today but I can certainly find out for you. The number today is not so important as the number we expect they will have five years from now.

[The information follows:]

The current and projected (FY 1995) Soviet force levels are as follows:

	1989	1995(est)
Victor I	16	16
Victor II	7	7
Victor III	23	24–30
Akula	5	21–25

Mr. DICKS. Are we talking about 30 submarines?

Admiral WOLKENSDORFER. There are 23 *Victor* IIIs right now.

There are five *Akulas.* I believe the *Oscar* Class and the *Typhoon* class, anything built after 1979, has been quieted.

When we talk about the acoustic frequency spectrum, ——— when the *Victor* III came out in 1978 ———. With the *Akula,* we now see a quieting effort across the board, so we are definitely seeing a transition there. ———. We have not capitalized on this in the past. It is part of the transition as we move into the ——— region.

It is a continually evolving process. We don't just drop dead or fall off the cliff now because of the *Victor* III and the *Akula* but you can anticipate that, as they get smarter, we will have more difficulty in the future.

Mr. MURTHA. How many submarines do they have that we have ——— ?

Admiral WOLKENSDORFER. I don't know the answer to that. I think without exception we have acoustic advantage over any of their submarines.

I think the issue is not so much whether we can detect them before they detect us, but that we keep the search rates up so we can detect them over a wider area.

ADVANCED SUBMARINE TECHNOLOGIES

Mr. DICKS. You are the guy who is going to be running this program. If additional funding were available, what specific technologies should be pursued and why? Where would you put the money? If Congress wanted to add money in this area, what recommendations would you have for us?

Admiral WOLKENSDORFER. I think what we have just talked about, in the ultrasonic side of the house, the very low end.

I think in the transient arena——

Mr. DICKS. What do you mean by that?

Admiral WOLKENSDORFER. ———. It is hard to recognize those things. You have to train people to an even higher level than they are right now to differentiate those from the surrounding noise environment. We can do that and with technology and algorithm development, we can do a lot more than we have done in the past.

We haven't had to do that ———. You have classification. In a transient, you don't have that. You have a detection, but you don't know what it is until you are able to sort it out.

Mr. DICKS. Would you put more into active?

Admiral WOLKENSDORFER. Yes, sir.

In the ——— we could probably accelerate that. This is an extremely important area and there are several programs ongoing within it which could be enhanced.

Mr. FAUGHT. In the area of oceanography, we are not up to the Soviets. We are ahead of the Soviets in advanced modeling, but it is something we are going to have to watch. They are catching up, which relates directly to how they can ———.

SOVIET SSBN SUBMARINES

Mr. DICKS. We have been focusing mainly on their attack submarines. What about on the ballistic missile side? This could be just as dangerous.

A number of us have been worried about the implications of the *Delta* IV and their new SS–N–21 missile——

Admiral WOLKENSDORFER. I believe it's the SS–NX–24 missile.

Mr. DICKS. Obviously the implication is that you could have a problem of detecting their offensive ballistic missile submarines—is that a fair assumption as well?

Admiral MCCARTHY. They have the same type of technology.

Mr. DICKS. Is the *Delta* IV in the same group with the *Akula* and the *Victor*?

Admiral WOLKENSDORFER. The *Delta* IV was an improvement over the existing *Yankee* Class submarine. The *Typhoon* is their first-line ballistic missile submarine. We have never seen that ——— so to speak. Neither have we seen a *Delta* IV, so one would anticipate that, when they ——— we would have a high

degree of difficulty in detecting them. That doesn't bother us as far as the SS–N–21 and SS–NX–24 cruise missiles are concerned.

Mr. FAUGHT. If you are looking to expand this, if we could detect their attack submarines, we could detect those also.

We have not talked about the proclivity they have for going still deeper. They are pursuing a design direction of increasing depth and that gets us into materials and some other things. We have in our program now advanced steels and composites, but that is another area we would have to include in our total ASW perspective.

Mr. DICKS. Thank you, Mr. Chairman.

Mr. MURTHA. Mr. Miller?

CLARIFICATION OF SONAR FREQUENCIES

Mr. MILLER. Thank you, Mr. Chairman.

When we are speaking of a detection first, to carry this on a little further, I understand that the Soviets do use 50 hertz in their electric generation in the submarines and on the motors that are necessary.

They are still using 50 hertz, is that correct?

Admiral WOLKENSDORFER. That is correct, on all their main submarines.

In the old *Alfa* Class, they used 100 hertz as a basic fundamental, but all the other submarines are 50 hertz.

Mr. MILLER. You mentioned about the fact that the lower frequency was easier to detect.

In what range are we talking about? What magnitude?

Admiral WOLKENSDORFER. The lower frequencies are easier to detect because they are less attenuated by the water itself. The lower you get, the great distance, for any given source level, that the sound will propagate within the water.

The detection range varies a great deal. For example, on a ——— for tactical systems and even further for surveillance systems.

I would suggest now that those levels have come down significantly and they are not in that range.

They used to work at that type of a range.

Mr. MILLER. Just ten hertz with our normal sixty hertz, that would not be enough to change this matter, would it?

Admiral WOLKENSDORFER. No, sir.

MINE DEVELOPMENT PROGRAMS

Mr. MILLER. In another area, the U.S. Joint Cooperative Development with the U.K. of an Advanced Sea Mine—I understand that has been terminated.

Mr. FAUGHT. That was terminated really at the instigation of the British. It is a worthwhile program. We had a 50–50 relationship with them. They also have apparently been having budget challenges and they terminated that.

We are now in the process of trying to identify other options we have which will meet the same objectives.

Mr. MILLER. Can you tell us a little about the other options?

Mr. FAUGHT. We really haven't——

Admiral MCCARTHY. The options are under study right now. In 03, the options are an improved Captor option.

We have a program to improve the Captor mine to bring it from ——— feet down to ——— feet and we are looking at putting in the ———. This gives us an improved countermeasure capability and an improved ——— capability. In addition, there is an option looking at the area that fills our void in the advanced Seamine and that significantly brings it down to about a ——— foot department. It includes a new array that would go on the Captor program along with contemplation of using the ———. The remaining option which is called the Captor Mod 3 program has not been funded. It is in the viewing stage.

[CLERK'S NOTE.—Subsequent to the hearing, Admiral McCarthy revised his remarks to read as follows:]

The options are under study right now. One option is the improved captor. We have a proposed program to improve the captor mine to bring it from a maximum mooring depth of ——— feet down to ——— feet. We are also looking at putting in a ——— torpedo. This gives us an improved lethality against the quieter soviet submarine. There is another option tht looks at a mine that would fill the void left by the termination of the joint U.S.-U.K. advanced sea mine. The captor option includes ——— along with the potential of using the ———.

Probably by August or September, we should have a good idea of where we are going with a program or development that will take care of the Advanced Sea Mine program. In a related mine program, we are developing an improvement to our Captor mine.

Mr. MILLER. What is the top priority as far as the Navy is concerned? Surely there is one above the other as far as our ASM program is concerned.

Admiral MCCARTHY. There is no question that the absolute top priority of the CNO and the Secretary of the Navy is antisubmarine warfare.

However we are still continuing in the Advanced Sea Mine area to look over our options as far as the Captor improvements, that is, the Captor 2 that I have mentioned to you. Those are the near-term improvements that we are really looking at, Mr. Miller.

Mr. MILLER. There was about $6.6 million in the 1988 budget under the Mine Development Program to improve the warhead lethality and detection sensitivity of the Captor mine.

You did mention earlier that maybe, as I understood it, that more would be done concerning the Captor mine.

Admiral MCCARTHY. The detection and classification unit is what we are looking at now and that is to do exactly what it says, to provide us better detection and better classification of those targets. That is ongoing and we look for that to come to fruition here. The warhead improvement program, that we are looking at is an extension of the ———. I can provide more information for the record.

Mr. MILLER. If you would furnish that for the record, I would appreciate it.

Admiral MCCARTHY. I would be happy to do that, sir.

[The information follows:]

To enhance payload performance, the Torpedo MK-46 MOD 5 (NEARTIP) Guidance and Control system is being adapted for use in CAPTOR and is expected to replace the currently used MK-46 MOD 4. This will enhance countermeasure resistance and improve hit distribution, thereby increasing the probability of mission abort.

RAPID ACQUISITION OF MANUFACTURED PARTS (RAMP)

Mr. MILLER. The Navy started the rapid acquisition of manufactured parts, that particular program, at least four or five years ago with the intention of having Naval Shipyards utilize its stated capability to produce parts quickly and affordably.

Could you tell us the status of this program now.

Mr. FAUGHT. That was one of the first areas of MANTECH that we in our definition initiated.

We initially intended to have two work stations in two of our sites, one in a shipyard and one in a repair depot. That is still our objective. The program has been stretched out, but is ongoing. It is needed, and we are following that closely in terms of trying to develop it further.

The IOC for the RAMP for the test and integration facility is ———. That is still our target. We may have three work stations at operational locations, we may have those still in South Carolina at that time.

Mr. MILLER. What is the amount of funding that has been put into the RAMP program?

Mr. FAUGHT. The total planned funding is $76 million. It has bounced around so much—$76 million for the two work stations.

I will have to get for you what that is for specific years.

Mr. MILLER. You could answer that for the record.

[The information follows:]

FUNDING FOR RAMP

[Dollars in millions]

Funds	Fiscal year—								Total
	1985	1986	1987	1988	1989	1990	1991	1992	
Research & Development	10.9	8.9	14.5	20.8	11.3	8.4			74.8
Non-Research & Development					4.8	12.4	12.1	10.5	39.8
Total	10.9	8.9	14.5	20.8	16.1	20.8	12.1	10.5	114.6

Mr. MILLER. You do mention the two work stations.

Mr. FAUGHT. Yes.

Mr. MILLER. What else have we received for that $76 million?

Mr. FAUGHT. The initial effort has been to bring together the technologies. As you recall, there were two principal purposes for the RAMP program.

One was to provide us critical parts which no longer are being produced because our ships have quite a long life cycle and the other was to have available to us on short notice parts made that may be still available, but are very expensive.

It is a double-edged sword there.

When we set out in the days of Secretary Lehman, we were talking about four work stations, and the refined price to that work was something like $120 million.

That is back in the neighborhood of, I think, $76 million now, but a big portion of that investment, the early investment, of course, was to develop the technology to perform that work.

There are four firms engaged in that effort at the present time.

Mr. MILLER. In your prepared statement——

Mr. FAUGHT. Incidentally, I welcome your interest in that area because it is something I believe that we have to do more.

R&D ON EXISTING SYSTEMS

Mr. MILLER. You mentioned it is the Navy's goal to ensure a significant portion of Navy R&D expenditures be used to improve and upgrade existing systems.

The initial guideline is to dedicate 16 percent of the total annual Navy R&D budget for this purpose by 1992.

What were the guidelines to come up with 16 percent?

Mr. FAUGHT. Let me tell you, if I may, a little bit about the background and then we can get to the guidelines.

We have had for some time the so-called "bow wave" problem between Navy R&D activities and our acquisition programs. We have set forth to reduce the "bow wave" and also to improve those assets we now have by various ways.

One is to prudently "neck down," if you will, the numbers of types of assets we have.

One of areas of R&D which is going to take money before we can realize significant cost advantage is the ATS, Advanced Tactical Surveillance aircraft.

It is in the genesis stage at the present time, we believe that if that proves feasible it could provide the same mission capability as currently being realized in three aircraft.

Another effort the Navy has ongoing now is in the munitions area. We plan to reduce the number of types of munitions we have through a "neck down" in this area.

In the other areas, we are trying to develop techniques and technology to provide greater manpower savings through innovations in simulation. We are doing that now—developing greater embedded simulators for a variety of applications. One possible application is having simulators on aircraft carriers, for example, so the pilots and crew can train and refresh on simulators versus using the aircraft and burning up fuel.

That also is directed towards improved maintenance and reliability. Those are the things that we have targetted. The 16 percent is an extrapolation of what we are doing now. The largest part of that is in the "neck down" area.

Mr. MILLER. What percentage of the Navy's R&D budget are you currently spending?

Mr. FAUGHT. The estimate is about 3 percent.

Mr. MILLER. The upgrades and modernization?

Mr. FAUGHT. Yes, sir. That was 3 percent in fiscal year 1989.

Mr. MILLER. But the proposal is still 16 percent by 1992?

Mr. FAUGHT. Yes.

Mr. MILLER. Do you anticipate that that figure will change in the next 5 years?

Mr. FAUGHT. That depends on many things. The next 5 years is going to be subject to many things, some of which have happened today. It is related to the budget constraints we will have. But as far as R&D planning is concerned, the planning for greater economies will remain one of our keystones. It has to be.

STRATEGIC SEALIFT?

Mr. MILLER. I have one more question.

Earlier in the year, we heard from the various CINCs and among the issues we discussed was our deficiency in both airlift and sealift. Basically, if push comes to shove, we simply can't meet our commitments in a timely fashion. The Air Force is addressing the airlift problem with its C–17 program.

If we were involved in anything more substantial than the Grenada operation, it is going to take sealift.

Mr. FAUGHT. The sealift situation, as you pointed out, is vital to us. I think the estimates are that in a major conflict, something over 70 percent of the needed cargo would have to go by surface. There is a conundrum here in part because a large part of our current sealift problem is a reflection of what our national sealift problem is, and that, of course, brings in the Congress, the Maritime Administration, and many things.

Our maritime industry is in really dire straits right now and this is reflected in our number and type of vessels. The type of vessels we need for a conflict are not the same type of vessels that are being developed for commercial cargo to date. The roll on-roll off type vessels for moving cargo, wherever they are built, are not the type that will be able to accommodate us.

We need more flexible design and faster craft. We are aware that nations such as Japan are already looking at this type of thing. In fact, recently it was published that the Japanese are in the process of developing a 50-nautical-mile per hour cargo ship. They are doing that for commercial purposes.

The Navy alone cannot really resolve the sealift problem, even though it is a grave issue to us. We are looking at advanced propulsion systems and at new hull designs, but it is going to require a combined effort between ourselves and the Maritime Administration with Congressional support to resolve this problem.

Mr. MILLER. Should we be developing a new type of fast sealift vessel or would your R&D money be better spent on some other type of priority?

Mr. FAUGHT. I believe Navy's R&D money in focusing on the relatively limited budget we have in relation to the challenge of the maritime problem the Nation has, would be better spend in other areas.

If we can spend those funds in a development which is compatible, for example a better and more powerful propulsion system, might be an answer. I think that would be wise, but this is a major nationwide problem.

Mr. MILLER. Can we reasonably expect that we might have a new type of fast sealift vessel where we would have a breakthrough or a leap forward and we would be missing that if we don't spend the dollars on the R&D?

Mr. FAUGHT. The Admiral has been looking at a new hull type. There is a problem there.

Admiral MCCARTHY. The current designs that people talk about include the surface effect ship. We have looked at these and we have built a 200-ton model. If you use a surface effect ship, you can get material across the ocean very fast. The problem is that you

have to carry a great deal of fuel in order to make the SES go fast. It therefore carries a small amount of cargo.

The SWATH hull does well in high sea states. We are building SWATH hulls for TAGOS ships. They don't go as fast as SES. One of the more interesting proposed concepts is the semi-planning hull that Thornycroft and Giles Corporation has advertised.

We have looked at this concept over a period of seven months with the David Taylor Research Center and NAVSEA. One of the aspects that the Thornycroft and Giles design stipulates is speed 30 to 40 knots. They are proposing shaft horsepower in the order of 400,000 horsepower with a water jet-type propulsion. A 400,000 horsepower ship would be similar in power output to *Enterprise* or *Nimitz*. It is not efficient for a 20,000-ton ship carrying 5,000 tons of cargo.

We don't think a ship with high power requirements and small cargo capacity is cost effective.

Also once you approach Sea State 5, you have a difficult time making semi-planning hull ships go fast through heavy seas.

Mr. MILLER. Thank you, Mr. Chairman.

Mr. DICKS. The gentleman from North Carolina, Mr. Hefner.

ENHANCED MODULAR SIGNAL PROCESSOR

Mr. HEFNER. Thank you, Mr. Chairman.

Since 1982, the Navy has been developing its next generation standard signal processor. This program known as Enhanced Modular Signal Processor, or EMSP, justified its high development cost—over $500 million—on the grounds that it would result in life cycle cost savings over the existing processor and would be procured in high volume due to its multi-platform application.

However, now that the first version of EMSP has completed development—the B version—and a production line has been built, the Navy has decided to keep buying the old processors and wait for a more complex version of EMSP to come along.

Does the EMSP "B" version meet its development requirements?

Mr. FAUGHT. This is really a conundrum. We have several applications for this.

We are going through a series of studies at the present time. The Navy three star Admirals under Admiral McCarthy's aegis are reviewing this now.

In a nutshell, what has happened is that we plan to use SEM-B on the SSN-21, but the development and the time for surface ship applications is such that they either can use the E or they can go to what they believe to be a further modification. For example, IBM is bringing a new model processor out which is not yet proven to be satisfaction.

The Admiral has had two meetings and I would like him to bring you up to date as to where that study stands.

Admiral MCCARTHY. The Navy is committed to the Enhanced Modular Signal Processor.

There are two versions of EMSP. The current version is going into the SSN-21. There is another version which we are going to use in the P-3 and LRAACA called the SEM-E. It does the same thing, but in half the space and weight.

It has greater potential for processing in the future because of the lower number of cards that you have in there.

We have always planned on having a SEM-B and E. The question that we are pursuing right now is, "what should the SURTASS units use?"

That has moved out to the right a bit. It appears that there would be about one-year delay in shifting from commercial to a SEM-B or -E module with the SURTASS ships, and we are looking very hard at whether we should do that.

I think the approach right now would be that the surface force would shift to a SEM-E model.

Mr. HEFNER. Is the B version ready for production today and is the E version ready for production?

Admiral MCCARTHY. The SEM-B version is essentially ready for production later this year.

The SEM-E version will be ready in the 1992 time frame. There is little technical risk in the E version. There is engineering that has to be done, but it is a rearrangement of the circuitry and the packs on the circuit board.

Mr. FAUGHT. What we are looking at right now is the decision which way we are going to go with the SURTASS surface vessel. The timing for development of the E is such that it would fall into the needs for the various platforms.

The B situation: the present plan is that we are going to equip four SSN-21s with the B and then we can either continue the B or use the E version.

Mr. HEFNER. The SQQ-89 surface ship program has delayed implementation of any version of EMSP until the mid-nineties, based upon funding constraints and developmental delays in the SQQ-89 program.

However, EMSP was developed to provide lower life cycle costs and higher reliability than the existing processor. Therefore, isn't such a delay penny wise and pound foolish?

Admiral MCCARTHY. We tend to think it would be exactly the opposite.

We think that with the lower number of chips and the lower number of circuit boards in the SEM-E design versus the SEM-B, you would be better off by going to the SEM-E.

In addition to that, there is a space and weight saving. What is also interesting is that if you want to increase your processing power, you could do that by adding extra boards to the SEM-E arrangement.

Mr. HEFNER. You have what amounts to a bird in the hand, but the other is just a projection.

You talk about the 1994-95 timeframe?

Admiral MCCARTHY. Yes, sir, but the real issue, as the Secretary mentioned, is when the surface forces shift to the SEM-E, when the SQQ-89 picks up the SEM-E, and it is only a year's delay for them to allow them to do that.

So the question becomes, do you put a SEM-B in there for one year or delay a year and then use the SEM-E product.

We think that the wise thing to do would be to use the SEM-E product.

Mr. HEFNER. Wouldn't the B and the E versions be compatible?

Mr. FAUGHT. Sir, as the Admiral points out, it is a volume and weight situation. The B version, if I recall correctly is water cooled and the E is air cooled. You would have to have certain modifications to accommodate both applications.

I think the question right now is the surface area is either going with E and the timing is fairly well coordinated there, or go with something else and that is something they are deciding on now.

As I mentioned, IBM has a candidate. Every time you get into a high-tech area, there is always going to be another technology coming along and that is a little bit of the conundrum we have now, particularly the timing.

Mr. HEFNER. I have no further questions.

Mr. DICKS. Mr. Wilson?

TORPEDO SPARES

Mr. WILSON. I have a couple of questions that are not quite that complicated.

We are developing the MK-50 torpedo?

Admiral MCCARTHY. Correct.

Mr. WILSON. Of course, the MK-46 is the one that is mostly in the fleet now, right?

Admiral MCCARTHY. Yes.

Mr. WILSON. I had some interesting conversation yesterday with the contractor involved saying that we are really neglecting and not buying any spare parts for the MK-46 and it is going to be a long time before the MK-50 is on line.

Admiral MCCARTHY. This is Honeywell?

Mr. WILSON. No, it is a contractor in Cleveland.

Mr. FAUGHT. They make the propulsion system for the MK-46.

Mr. WILSON. They were saying we hadn't bought any spare parts for three years and their opinion was that we were reducing the number of drills because we didn't have any spare parts for the MK-46.

Mr. FAUGHT. We can look into that. That is not R&D, but we could look at that. I think it is a good question.

Mr. WILSON. I would appreciate it because that would seem to be an oversight if that was occurring.

[The information follows:]

The MK-46 torpedo program is not short on spare parts. Through a carefully scrutinized critical spares review program coordinated by SPCC, Mechanicsburg, and directed by NAVSEA, spares acquisition is carefully managed to ensure that the MK-46 torpedo program's needs are satisfied. Over the past three years, through acquisitions by SPCC and in accordance with 1988 Congressional direction, over $15 million in spare parts have been acquired from the contractor in question (Argo-Tech). Additional acquisition needs, including a life of type buy out of certain propulsion systems parts made by this contractor is under review at this time. Parts would be ordered prior to the contractor's production line shut down in order to minimize costs. Concerning the statement about the reduction in exercise firings, the MK-46 torpedo annual exercise firings are being reduced, but not as a result of not having enough spare parts.

TACTICAL AIR-LAUNCHED DECOY

Mr. WILSON. Are you familiar with the TALD, the tactical air-launched decoy?

Mr. RUMPF. Yes, sir.

Mr. WILSON. Is there in R&D a plan to make a powered version of the improved TALD?

Mr. RUMPF. There is a plan reviewed by OP–05 for introduction of a powered variant that would satisfy certain limitations in the current unpowered version, yes, sir.

Mr. WILSON. It wouldn't be cost effective to let that production line die if we decided to go ahead with the improved one, would it?

Mr. RUMPF. That was an issue that unfortunately fell into the unaffordable category when we reviewed the budget. It was deemed this was an area that had lower priority in terms of other budget issues like antisubmarine warfare, et cetera.

Mr. WILSON. What is the mission?

Mr. RUMPF. It is a derivative of the system that the Israelis took from us originally called the Samson. It was used effectively in the Peace in Galilee campaign. It is an unpowered store, a glide weapon system, launched without any further instruction from the pilots going into a pre-planned area. It glides in and is picked up as a radar contact to focus and tie up air enemy anti-air capability.

It has a chaff-dispensing capability, which pushes chaff out of the rear end of the vehicle creating another barrier because we can jam into that chaff, creating a cloud of confusion for enemy radars attempting to detect our incoming assets. It is used effectively at training sites in Nevada in what we call "Strike University." It is used by our fleet every time the airwing prepares for going out on deployment; they come in and use it and they have been raving about its capability.

Mr. WILSON. Is it expensive?

Mr. RUMPF. No, sir. It is a joint program between ourselves and the Israelis. Brunswick is the manufacturer; IMI is teamed with McDonnell Douglas in Titusville as the second source competing against each other, and they average about $23,000 a copy.

Mr. DICKS. I won't ask any more questions. I think you have done pretty well here.

Mr. WILSON. I think you are probably right. No further questions.

Mr. DICKS. Mr. Hefner.

ENHANCED MODULAR SIGNAL PROCESSOR

Mr. HEFNER. Mr. Chairman, according to some information that I have, the existing processor, the way I understand it, and this is according to a Navy study, over the life cycle costs eight times as much as the new one if we went ahead with the B version.

I also understand that the B would be compatible with the E version. It seems to me that this costs less. So why would we wait for another system that is just around the corner that we are not sure about?

Mr. DICKS. And you have got the production line there and we have cost shared this with AT&T. I don't understand it.

Mr. HEFNER. It doesn't make good economic sense to me.

Admiral MCCARTHY. You are going to have to build the SEM–E version because you can't get a SEM–B version of the EMSP into an airplane or into a helicopter.

That has been a given all along, stated in the plan. We have talked about that to everyone. You are going to have to do both.

The question becomes, "what should you do to give you the best capability at the most reasonable cost?" So, sometime in the production line, you have to shift from SEM-B over to SEM-E. It appears that the best time to do that, since the SQQ-89 program has moved out to the right, is about the time you bring the SQQ-89 on the surface ship. You could put a few of these SEM-Bs into the surface ship program.

Would you want to keep them there? Sooner or later you would either decide to leave them there or decide to retrofit them with the SEM-E. We are trying to face up to that kind of a decision early on.

Mr. DICKS. Is it being done for budgetary reasons? Is the reason for this lack of money?

Admiral MCCARTHY. No, sir. It is to get the program straight so we can put the proper money in the right years and we won't have to keep coming back here saying we have changed the line next year or we are going to ask for another reprogramming this year.

We are trying to get the financial structure of the program in good order.

Mr. FAUGHT. The thing that will boost the cost is if the SURTASS force decides to go another direction. As far as the B and the E, there is no budgetary situation there.

Mr. HEFNER. Well, haven't you had a reprogramming request for the last few months that has never gotten over here because you can't decide exactly what you want to do?

Admiral MCCARTHY. Mr. Hefner, you are correct. That is in fact what is going on right now. We have not been able to get the above threshold reprogramming out of the building because we have not been able to come up with a good solid, long-term plan. We are not going to let the request go until we have that good, long-term plan.

I am hopeful that by the end of this month we can have a program review before the Secretariat. We will lay the program out over the next five years so we understand what it is going to cost.

Mr. HEFNER. It seems to me that we are not operating—with the limited dollars that we have and all the restrictions that we have, it seems to me we are not acting in a very smart economic fashion in this program.

I mean, if my information is correct, the old system costs eight times more to operate over the life cycle. You have the new SEM-B that is ready to go, with a production line and a shared program of over $500 million and the SEM-E version would be compatible, that could be used in the P-3s; is that right?

So what is your advantage to continuing to delay? Is it just a hope that it is going to be something that is far, far better or is it just one of those illusions that is out there that it might be better?

Mr. FAUGHT. I think there may be a misconception because we always have had in the program the B and the E. The situation really relates to what Admiral McCarthy and his people will come up with next week as to what we are going to do about the surface area, because they are the fundamental drivers of the E program.

Mr. HEFNER. I understand that, but you have got the SEM-B that works on the surface ships and the SEM-E on the P-3s that would work, is that right?

Mr. FAUGHT. Correct.

Mr. HEFNER. But you don't have anything else that would take care of that; it is just something that you are thinking about, hoping to develop?

Admiral MCCARTHY. No. sir. The E version is for the P-3 and for the aviation community. The B version won't fit in the airplanes; it is too heavy and too big.

We have to develop the E version for the helicopters, the P-3 and the LRAACA.

Mr. HEFNER. But the B works fine in the surface ships?

Admiral MCCARTHY. Yes, in a surface ship and a submarine. The question becomes, "are you going to have two production lines?"

The real issue is, "When do you go to an E production line?"

Mr. DICKS. There will be a gap now, you are in production, you have a production line now, is that correct?

Admiral MCCARTHY. Yes, sir, with the B.

Mr. DICKS. Have you produced any Bs?

Admiral MCCARTHY. We are at the point we are going to go to production.,

Mr. FAUGHT. We are entering production in August.

Mr. DICKS. You are producing some?

Admiral MCCARTHY. Yes, sir.

Mr. DICKS. The E is not ready to go, you are still doing the R&D on the E?

Admiral MCCARTHY. Yes.

Mr. DICKS. Why won't you do the B until you are ready to switch to the E and then switch to the E?

Admiral MCCARTHY. That is the 1994 time frame, the point that you start bringing on the SQQ-89 where you have a requirement for an EMSP. If you wait one more year, you can put the SEM-E version in the surface ship, if you wait until about 1995.

Mr. DICKS. But between now and then you don't have that better capability that you get from the B?

Admiral MCCARTHY. We planned on doing it in 1994.

Mr. FAUGHT. We won't need the Es until 1994. SEM-Bs will be produced and into the SSN-21.

Mr. DICKS. This is the B?

Admiral MCCARTHY. Yes. We may have to stockpile a few units in order to keep that production square and that is the subject of the meeting that is going on tomorrow in the Pentagon.

Mr. DICKS. Anything else, Mr. Hefner?

Mr. HEFNER. I don't think so.

ADVANCED SUBMARINE SYSTEM DEVELOPMENT

Mr. DICKS. The Navy requests $37 million in fiscal year 1990 for a new start called "Advanced Submarine System Development." The program, which is budgeted at $438 million over the next five years, is meant to transition promising ASW technology base projects into development.

Mr. Secretary, the Navy has only included $85 million over fiscal year 1990–94 for 6.2 level work in submarine technology. It doesn't seem reasonable that such a small level of effort could produce the magnitude of technical advances to justify spending so much money on transitioning those projects.

I assume taking 6.2 work into 6.3–A. They are only spending $85 million on R&D efforts that would lead to transition. How do you explain that?

Admiral McCarthy. I will have to go back and look at that line, but we have worked very closely with DARPA on the things that they have in the advanced submarine technology program.

We have established a new billet in NAVSEA under Rear Admiral Evans and the first area to come to transition is the HY–130 program. I think that the other items that are in that particular line are of a longer nature that ramp up fairly steeply in the out years, but not so steeply in the near term.

Mr. Dicks. Tell us a little bit about the HY–130 program.

Admiral McCarthy. That is a program that has been around for sometime. Our present submarines are constructed out of HY–80 or HY–100. HY–130 is a steel that gives you a greater strength, and lets you go to a deeper depth.

We had originally programmed to put a large section of HY–130 in a submarine called the DOLPHIN on the West Coast to qualify this steel for submarine construction. We recognized, however, that to bring this technology into the SSN–21, that we would have to do this in a different manner. We have changed the method that we were originally going to use to qualify the HY–130 and decided to qualify it using an internal pressurization process that will cycle it in pressure and give it the number of cycles that we need to develop the bending moments caused by increasing or decreasing depth changes.

Mr. Faught. One of the major concerns is the welding of the steel itself.

Mr. Dicks. The committee is informed that much of this funding would be used to modify an existing SSN–688-class submarine for R&D purposes.

I think that is a very positive step, by the way.

Admiral McCarthy. The U.S.S. *Memphis* is the submarine we are going to modify Mr. Chairman. This will occur over a 5-year period.

The *Memphis* is scheduled for an overhaul in about the 1994 time frame. We will in fact put a number of things into her to test.

Mr. Dicks. Where will it be overhauled, do you know?

What is the total estimated cost of this modification?

Put it in the record.

[The information follows:]

The U.S.S *Memphis* is currently scheduled to be overhauled in the Portsmouth Naval Shipyard, Kittery, Maine. The current estimated R&D cost to complete modification to the Research and Development submarine is $105.04 million.

Mr. Dicks. If the chosen submarine meets its 30 year design life, how many years will it be available as an R&D asset?

Admiral MCCARTHY. We should have it available for 13 years. This is in fact a fleet submarine, so not only will we use it for R&D, but it will be quickly returnable to a fleet asset.

We intend to put the larger torpedo tube in it that will be in the SSN-21. Some of first items tested will be motors using magnetic bearings. We think this will be very interesting in terms of sound quieting. Eventually I think we will put the wide aperture array on it.

Mr. DICKS. When will it be available for testing?

Admiral MCCARTHY. I believe 1996 is the year it will be at sea.

Mr. DICKS. 1996?

Admiral MCCARTHY. Yes. sir.

Mr. DICKS. Is this going to cut into other funding for submarine technology development?

Admiral MCCARTHY. No, sir.

Mr. DICKS. It will complement it, won't it?

Admiral MCCARTHY. Yes, sir.

ADVANCED SUBMARINE TECHNOLOGIES

Mr. DICKS. What is the Navy's view of the potential contribution of DARPA's advanced submarine technology program and why has the Navy not included funds in fiscal year 1990 to take over that effort, or have you?

Admiral MCCARTHY. That is a DARPA program. We feel very good about the advanced submarine technology money that is in the program at DARPA. We have worked very closely with DARPA on it along with the Chief of Naval Research. We think we have a very good program. We are looking forward to getting some of the things in the program out into the fleet. The transition office is the office headed by Rear Admiral Evans. DARPA tried to put last-mintue monies into it, but that did not happen when the budget came to the Congress this year.

Mr. FAUGHT. We understand, Mr. Chairman, that DARPA has committed to putting in levels of between $25 and $50 million beyond the FYDP. That, of course, is subject to modification as well.

Mr. DICKS. So they had money in their budget that didn't get through OSD, as I understand it. It was cut out by Secretary Taft and now the question is, what is going to happen with the work?

I am informed that the House Armed Service Committee is very serious about reauthorizing it, even though it is not budgeted. If they don't, we want you to take as much advantage of that effort as you can.

Mr. FAUGHT. We will.

Mr. DICKS. I understand you had a Navy person who was number two in command of the DARPA effort.

Mr. FAUGHT. Admiral Brickell is retired and his replacement was——

Admiral MCCARTHY. Admiral Brickell's replacement is in OP-098. He is the individual from OP-098 that sits on the Advanced Submarine Advisory Panel.

We chair this board and work closely with Ron Clark from DARPA. The number two in command of this DARPA effort is

Captain Mark Pelaez. I don't believe that he is retiring. We look upon him as being one of the young comers.

V-22 DEVELOPMENT

Mr. DICKS. Could you give us an update on the status of the V-22 development program, the Osprey?

General FRANKLIN. As you know, sir, the V-22 has flown nine times. The initial aircraft is now is a tear-down status. We are going to examine all the moving parts and dye check it for cracks and all the other things that can happen to new machines.

The No. 2 aircraft will roll out the first week in May and begin flying. The program right now calls for six FSED, Full-Scale Engineering Development aircraft and a 4,000-hour test cycle. Sixty percent of the testing will be done by military pilots. Milestone III Alfa production decision will be made about December of this year.

So that is really the rundown on the program right now.

Mr. FAUGHT. The flight test the general is referring to met all of the criteria.

Mr. DICKS. The V-22 now begins an ambitious development flight program. Historical data on other aircraft programs shows that the V-22 program plans to put its test aircraft through more flight hours than the average aircraft program.

Are you concerned that these aircraft will show mechanical stress and fatigue during the latter stages of the test program?

General FRANKLIN. We have a new technology. When you go through the production plant, you don't see any rivet guns; it looks more like a surgical office with guys in white smocks and scissors putting this thing together.

Mr. DICKS. That is because of the epoxy?

General FRANKLIN. It is all composite. Composite structures are not subject to the same cracking that you have with metal structures.

We have done a tremendous amount of basic testing and engineering of the structure material. It is an ambitious flight program, but with six aircraft, it is not unusual to put 60 hours a month on each aircraft, and so you could put 360 hours a month on the fleet of six at Pax River.

We will be pushing the machines, but I think that they will make it.

Mr. DICKS. What is in the budget for this?

General FRANKLIN. I don't haye those figures. I will have to take that for the record.

[The information follows:]

V-22 FUNDING

[FYDP in millions]

	Fiscal year—					
	1989	1990	1991	1992	1993	1994
Aircraft Procurement Navy:						
Aircraft	334	1,267	1,540	1,915	2,017	1,826
Spares	0	152	189	190	228	287
RDT&E, Navy:						
Aircraft	303	221	178	111	35	16

V–22 FUNDING—Continued

[FYDP in millions]

	Fiscal year—					
	1989	1990	1991	1992	1993	1994
Total	637	1,640	1,907	2,216	2,280	2,129

Mr. DICKS. Do you need an escort aircraft to protect the Osprey during its missions?

General FRANKLIN. Yes, sir. The Osprey at the present time has no self-defense guns or missiles. It is strictly a troop hauler at the moment.

The ideal escort aircraft for an Osprey is an aircraft that has a 50 percent speed advantage so that it can engage threats and return to the flight without having the flight orbit in Indian country. The flight presses on to the destination.

The ideal aircraft is the AV–8B.

Mr. FAUGHT. We are considering conceptually some type of weapon for the aircraft.

General FRANKLIN. That is right. There are some plans in the future to put a self-defense sysem on it, but right now it is not funded.

T–45 DEVELOPMENT PROBLEMS

Mr. DICKS. The Navy requested $429 million in fiscal year 1990 to continue procurement of T–45 trainer aircraft. However, the T–45 ran into significant development problems during operational testing in late 1988.

Mr. Secretary, in his December, 1988, report, the Commander, Operational Test and Evaluation Force (OPTEVFOR) declared that the T–45, in its current state, "does not have the potential to be operationally effective in the carrier training environment," and "does not have the potential to be operationally suitable."

What is wrong with the aircraft?

Mr. FAUGHT. There were three things wrong with the aircraft and again the Admiral has been working on the fixes. There are still questions about flight characteristics and about the power. There is some problem in the design itself. We have been working on all of these throughout the spring, and all of these problems appear to have solutions. I would like the Admiral to tell you about the technical aspects.

Admiral MCCARTHY. I flew the aircraft about four weeks ago. Fortunately, we have the benefit of having Admiral Wolkensdorfer here, who was the Operational Test and Evaluation Commander.

The problems are in the stability area of the aircraft, in that it feels a bit unstable. The nose tends to wander. It has a yaw problem. The correction is to extend the tail cap ten inches. We think we may be able to do with a little less extension of the tail cap, perhaps down to eight inches. The speed brakes open very fast. They don't have any restriction built in. We will put in a restricting device.

We may also put in a control that will let you modulate the speed brakes when they open. They will close at the same speed.

The other characteristic that was unfavorable was a stall characteristic. It gave no warning on stall. We are installing a rudder shaker to the rudder pedals so when the angle or attack gets high enough, the shaker will let you know that you are approaching a stall.

We are looking at working the forward-leading edge of the wing to make the stall less dramatic.

The last area that probably gives us a less of a degree of comfort is in the area of the power response of the engine. When you are in the carrier landing approach, in close to the ship working off a high condition, it is difficult to get the power response back on quick enough. The current fix is to use a plate in the throttle quadrant that will not let you pull the throttle below 70 percent. We are not sure that this is the ultimate answer. We think that we may have to do something else to increase the response of the engine when you pull the power back. We are looking at another engine, at increasing the temperature of the current engine by redesigning the hot section. We feel these are well within the state of the art as far as where the company is.

Mr. DICKS. We were told this was supposed to be a low-risk effort, that we were taking this British aircraft and modifying it. From what you have told us, it sounds like it has been a disaster.

Admiral MCCARTHY. I would not characterize it as a disaster. I think that the things that you are running into——

Mr. DICKS. What is the problem with the contractor on this?

Admiral MCCARTHY. We have taken an aircraft that was used in Great Britain for land training and have converted it to a maritime carrier capable airframe.

Mr. DICKS. Was that a mistake?

Admiral MCCARTHY. No, sir. It was a low-cost, cost-effective way to go. It is a fixed-price contract; the contractor is responsible to meet the specifications.

Mr. DICKS. What is the current schedule to make these corrections and verify them in testing?

Admiral MCCARTHY. As I mentioned, the speed brake restrictor and the tail cone are on there now. They have looked at buttons on the wings, stall fences, and at the wing itself. There should be retesting going on later this month. We ought to have those three areas pretty well settled by the end of the month.

I can't give you an estimate of where they are in the power response area.

Mr. DICKS. What do you make of the criticism of the operational test and evaluation force, when they say it is not suitable to be operationally effective in the carrier training environment, and does not have the potential to be operationally suitable?

Admiral MCCARTHY. I would like to let Admiral Wolkensdorfer talk about that and I will reply to what he says.

Admiral WOLKENSDORFER. In my previous incarnation as Commander of the Operational Test and Evaluation Force, we ran the T-45 through testing. Suitability has to do with the experience of the person trying to take it aboard the carrier. When you are high, you chop power and it sinks, you develop a sink rate, you can't get

the power back on quick enough to keep the airplane from settling quicker than we would like to see it done. That is the suitability issue. Can it be corrected; yes. It needs focus to do so.

When we say "potential" in the OPNAV or OPTEVFOR vernacular, and we deem it as "unsatisfactory" that means somebody has to do something in order to make it potentially sound.

Admiral McCarthy. The two things that are important in that, Mr. Chairman, are the fact that this aircraft is really designed for a student, for a young fellow that has only 50 or 60 flight hours or so.

He is probably doing his first carrier landing practice, when he has 200 to 270 hours. So he is just beginning. Of course, the carrier landing is at the tailend of the training syllabus.

Mr. Dicks. This program is on a firm fixed-price contract and the Congress has gone to extraordinary lengths to protect the program's funding due to Navy's claim that the effort was low risk and under a capped contract. Now that the program is in trouble, there are rumblings that the cap might be lifted, or fixes pushed into procurement.

Is there any truth to that?

Mr. Faught. The only thing we can see right now, Mr. Chairman, that would violate the cap, so to speak, as far as Navy funding is concerned, is if we would have to do something dramatic with the power unit, if we had to go to a different power source, and the redesign that would be related to that, but that is not envisioned at this time.

Mr. Dicks. Are you saying the engine is underpowered?

Mr. Faught. No. The power control situation has yet to be fully assessed, but if we were to have to go to a different power unit, that would be the only reason that we would have to put more money in.

Mr. Dicks. Does the warranty provision of this account protect the government at all against cost overruns?

Mr. Faught. Yes, it does. I bring up the power situation as being the only possible change in the financing liability we would have.

Mr. Dicks. Why did we derate the engine when the additional thrust was needed?

Admiral McCarthy. There is no problem with the thrust in the engine. You have enough. It is a fan engine. The problem that you run into with fan engines is "spooling" them up once they have unspooled, decreasing the response time in order to get the power on. That is characteristic with fan engines. So it is response time we are looking at.

We derated the engine to increase the life cycle of the engine and we would not want to go back to increasing the temperature of the engine because that would decrease the reliability and maintainability that we were originally looking for.

Mr. Dicks. When will a fully-qualified uprated engine be available for operational testing?

Admiral McCarthy. I don't know what the final fix is going to be.

Mr. Dicks. When will you know?

Admiral McCarthy. We should know, I would think, within four to six weeks.

Mr. DICKS. Would you report back to the committee about that?

Admiral MCCARTHY. Yes, sir. A briefing will be provided when information is available.

ADVANCED TACTICAL FIGHTER AND F-14

Mr. DICKS. The Navy has agreed to use a variant of the advanced tactical fighter as its next-generation fleet air defense fighter aircraft. Currently, that mission is performed by the F-14 Tomcat.

If the Navy is truly committed to the Navy ATF, why have you budgeted over $450 million in the next five years to continue upgrading the F-14?

Admiral MCCARTHY. As you know, one of the programs that we have had ongoing in the aviation community has been the F-14D program. One of the original faults with the F-14 was the TF-30 engine. We just did not have a good engine in the F-14. We have looked for many years to shifting out of that engine. We have finally settled on an engine that we and the Air Force can use together, the 110 engine. It increases the aircraft's capability in a much more dramatic fashion.

We have other improvements that are going in to the F-14 such as improvement in the radar and digital avionics; we have a wide selection of air-to-ground weapons that the aircraft will be able to handle.

We are trying to make the F-14 last from 1994 until the year 2005 or 2006 or 2007, whenever the Navy introduces its next-generation fighter in ATF.

Mr. DICKS. We are told that there are a lot of other things that go into this upgrade of the F-14 beyond the engine, is that correct?

Admiral MCCARTHY. I think you may be referring to what we call the pre-deployment update which puts in the capability for the HARM missile.

It adds additional software programs to the aircraft that will allow air-to-ground weapons to be used from the F-14 in an air-to-ground mode. This will allow air-to-ground use at sea coupled with the new ECCM features.

We think those are things that you really need to do to the airplane.

We would like to incorporate those improvements as we move the aircraft through the production line.

Mr. DICKS. Some have suggested this might be a way to get more funding without appearing to violate the F-14D's contract value.

Admiral MCCARTHY. We are trying to improve the airplane and that is all we are trying to do.

MK-48 ADCAP TORPEDO

Mr. DICKS. A few months ago, the committee was advised that the MK-48 ADCAP torpedo is ———. To date, almost $1 billion has been appropriated to develop this program.

Please explain why the U.S. Navy spent $1 billion on a torpedo which can ———.

Admiral WOLKENSDORFER. No. sir. That is not accurate. I did the OPEVAL on the torpedo at Norfolk several months ago.

First of all, the MK-48 ADCAP is a significant improvement over the existing MK-48. It carries that improvement up through ——— and does that very, very well. ———. There are two existing programs ongoing now which have the potential to fix that, and neither are hardware-oriented. ——— in a different manner than it is done now. We can backfit that when it's complete. ———. As far as the equipment is concerned, no, sir, the $1 billion is a great investment. We need to do some changes to fix it now ——— but those are software and tactics related.

Mr. DICKS. As was mentioned today, the Soviets have a propensity for going deeper.

Can our front-line torpedos go after these deeper-diving subs?

Admiral WOLKENSDORFER. Yes, sir.

Mr. DICKS. What about on the ———. They told us that we still have a problem with ———? What is being done to try to fix that problem?

Admiral WOLKENSDORFER. We have a ———. In the SSN-21, we will also have a ——— capability built into the submarine itself. So both of those issues are being addressed.

Mr. MILLER. Would the gentleman yield?

When you speak of the difference between the MK-48 and the MK-50 and ——— does that mean a great deal?

In other words, the time frame is short there where you could use that information; the information of how quiet it may be and do something about it.

Admiral WOLKENSDORFER. If you are in a tactical situation and you fire a torpedo from, say ———. From an opposing viewpoint, if you ——— you can put out countermeasures and do things to help youself.

Mr. DICKS. Plus you can fire at the submarine. It is the identification of the submarine you worry about.

Mr. MILLER. That is the countermeasure you spoke of earlier. This is one of the reasons why it would be good in order to counter that and you would have the time by reducing the noise level?

Admiral WOLKENSDORFER. Yes, sir. You reduce the time.

ALLIED SUBMARINE TECHNOLOGY DEVELOPMENT

Mr. DICKS Let me ask generally one last question.

The report of the Advisory Panel on Submarine and Antisubmarine Warfare, in discussing the limitations of passive sonar, note significant innovations in Italian, German, and Swedish designs of non-nuclear submarines.

They note that new forms of non-nuclear propulsion—closed-cycle diesels, Sterling engines, and fuel cells show potential for vastly greater submerged endurance than conventional diesel electric boats, while retaining its low-cost acoustic signature.

What is the Navy doing to monitor such developments?

Mr. FAUGHT. One thing we have underway with the Italians is looking at the application.

Mr. Chairman, they have a small submarine and we are looking at not only the diesel, but also the method in which they can recycle the gases to remain undetected.

What application that would have on a larger vessel—that is one thing we are looking at.

Admiral MCCARTHY. The hull that the Italians have is called a toroidal hull made out of rings of pipe. It is an interesting design with significant depth capability.

We are looking at that design under the advanced submarine technology program. I think Honeywell is working with Mauritalia in Italy on the joint venture. We are looking at that particular hull for ——— vehicle.

The closed cycle engine is of interest, but that requires an oxygen source in it so that you not only have to put fuel into it, you have to put oxygen into it and while it does extend your range, it does not extend it to the degree that you would find in a nuclear submarine, for instance.

Mr. MILLER. What were you calling the engine—

Admiral MCCARTHY. A closed-cycle diesel engine. There is an Italian and Swedish design.

ASAT TECHNOLOGY DEVELOPMENT

Mr. DICKS. For the record, there is some confusion as to just what efforts are included in the budget request to examine ASAT technologies and how they will be coordinated.

Could you explain this situation for us from the Navy's perspective?

Mr. FAUGHT. We will take that for the record.

[The information follows:]

The Navy effort will examine existing and emerging technologies to develop and refine sea-based ASAT concepts and to define an acquisition strategy. We will be coordinating this effort with the recently established ASAT Joint Program Office for which the Army is the interim lead service, in support of the Defense Acquisition Board milestone 0 directive.

The Navy sea-based ASAT system conceptually will be deployed worldwide on mobile, survivable, vertical launch capable ships and/or submarines and consist of a conventional rocket delivering a kinetic kill vehicle with an as yet to be determined seeker (radar, visual, IR or other) for terminal homing. The weapon will be "hit to kill" or may employ some kill enhancement device. The system is expected to meet or exceed all near term ASAT requirements.

Mr. FAUGHT. The ASAT situation is vital to us. We have to have some method of reducing the risk to our carrier battle groups.

Mr. DICKS. Are you suggesting that without an ASAT, we do not have ways, by use of jamming and other tactical means, of protecting our——

Mr. FAUGHT. No, we have methods to protect our fleet from the present threat. However the risk will increase as the capacity of the Soviet surveillance satellites increases in the future.

Mr. DICKS. Admiral Nagler testified before this committee several years ago and he, with the back of his hand, said we can handle this threat with the current capability of the United States Navy. I don't want to sound as if the whole fleet is out there defenseless; he talked about spoofing and jamming and other things that we do.

Mr. FAUGHT. In the ensuing period, after the Falkland campaign, we found that the Russians, have the capability of putting up numerous additional surveillance satellites and we have every reason to believe that given proper weather conditions, they could increase their capability to keep track of our fleet.

We have to have something to complement our other weapons to take care of that.

Mr. DICKS. To attack Soviet satellites?

Mr. FAUGHT. Yes. I believe it is true that the Soviets already have a weapon system which—with a different type of flight configuration can attack ours.

Mr. DICKS. Do you remember how many years now since they have tested that system—I think it is six or seven. How confident would you feel in a system that we hadn't tested in six or seven years?

Admiral MCCARTHY. It depends on the type of testing program. You would like to be able to test it on a fairly frequent basis so you can see how it works.

[Additional information follows:]

The booster that would be used to carry the Soviet ASAT is in operational use so it does not require testing. The Soviets practice joining the ASAT to the booster to exercise ground crews and conduct simulated ASAT engagements.

Mr. DICKS. There has been all this discussion in the press, confusion in the press, the Army is here, the Navy is there, the money is the Navy's but the Army is going to run the program.

Can you clarify the situation for us?

Mr. FAUGHT. Army has been given the nod to lead the program initially, and we are looking with Army at both the land-based and sea-based system.

There is a lot of technology involved, and we think that within the foreseeable future, that should be a Navy-led program

Beyond that——

Mr. DICKS. There has been a lot of discussion that if you don't get to run the program, you are going to take your money out of the budget. Some up here might approve of that since you seem to have the most money for this program.

Mr. FAUGHT. I think at this point that is an invalid inference.

Mr. DICKS. What are you talking about trying to do? What kind of a weapon are you looking at to develop here?

Mr. FAUGHT. We are talking about several.

Admiral MCCARTHY. We are between a milestone zero and a milestone one. We have two particular programs moving forward, the Army program for a land-based ASAT, and the Navy program, which envisions a sea-based ASAT. Using the VLS systems we have on our cruisers and submarines, the missile would be a new design missile utilizing existing SDIO interceptor technology. We feel reasonably confident that we can do this in a fairly short period of time. We think it is a very cost-effective program. If we use the surface ships, we could also use the Aegis technology and that radar. We would have to modify it a bit to give us a better guidance system, but we think we would have a very effective ASAT system and we think we will need that system in the year 2000 because we see a much more aggressive program with the Soviets in space.

Mr. DICKS. Admiral Crowe said this is one of his two top priorities as Chairman of the Joint Chiefs, to get an anti-satellite weapon.

Any further questions, Mr. Miller?

Mr. MILLER. No, thank you.

Mr. DICKS. Thank you, gentlemen. We have additional questions for the record which we would appreciate answers for.

The committee is adjourned until 1:30 p.m. this afternoon.

[CLERK'S NOTE.—Questions submitted by Mr. Dicks and the answers thereto follow:]

NAVY DOLPHIN PROGRAM

Question. The Navy has in place a mammal program at a number of locations to provide a variety of missions. Please describe the current program and procedures that are in place to assure the health and safety of the involved animals.

Answer. The Navy has marine mammals in San Diego, Hawaii and Key West, Florida. The Navy's marine mammal program is supported by a strong veterinary medicine program designed to provide the best possible care for the animals and to conduct research into expanding marine mammal medical knowledge. The Veterinary Medical Program is headed by Dr. Sam H. Ridgway, DVM, PhD, who is the Senior Scientist for Animal Care. Dr. Ridgway is recognized as the leading marine mammal veterinarian in the world and as such is consulted internationally on a regular basis. Dr. Ridgway is located at the Naval Ocean Systems Center, San Diego where he is assisted by a U.S. Army veterinarian (Captain Richard Linnehan, DVM) and two Navy Hospital Corpsmen trained as marine mammal veterinary technicians. The veterinary staff in San Diego is also supplemented by two post-doctoral veterinarians (both of whom have PhDs as well as DVMs) who are conducting studies on marine mammal physiology and care. Dr. Peter Schroeder, DVM, is the civil service veterinarian at the Naval Ocean Systems Center, Hawaii Laboratory. Dr. Schroeder is assisted by a civilian biolgoical technician, a U.S. Army veterinarian (Captain Michelle Magee, DVM) and an Army Veterinary Technician.

The NOSC, San Diego veterinary staff supports the veterinary requirements of the operational Fleet marine mammals. Because of the distance from San Diego to the Navy's marine mammals in Key West, Dr. Greg Bossart, DVM, of Miami is on contract to the Navy to provide medical care to those animals. The San Diego veterinarian staff conducts physical exams of the Key West animals and provides other medical support as required. The Navy's veterinary medical program was evaluated by a Marine Mammal Commission Review Team in December 1988 and found to be excellent.

Question. Navy is proposing to expand the program to the Trident Submarine base at Bangor, Washington. What missions will be performed at this location?

Answer. The marine mammals that are being moved into Naval Submarine Base Bangor are part of the MK-6 Marine Mammal System (MMS). The MK-6 MMS is a ——— using Atlantic bottle nosed dolphins.

Question. Are there practical alternatives to the use of marine mammals for this mission?

Answer. There are no practical alternatives to the use of marine mammals to perform this mission. All known alternatives have

been explored and they have been found to be substantially lacking in capability.

Question. What plans does Navy have to monitor unique health questions at the Bangor location, including water temperatures reaction?

Answer. The marine mammal unit at Bangor will have a full-time veterinarian in attendance when they are first moved. After some period of time, this veterinarian will be replaced by a contract veterinarian from the local area. The animal's health at Bangor will be monitored by daily observation of the animal's behavior, by keeping track of daily food intake, by taking core temperatures and weighing the animals monthly and by taking blood samples as required. We do not anticipate any problem with the animals adapting to the water temperatures. Since the early 1970's the Navy has been concerned with the ability to use marine mammals to perform Navy missions in a variety of environments. This concern is not merely one of survival but of keeping the animals healthy so that they are able to perform trained tasks. The Navy has conducted research into cold water adaptation of Atlantic Bottlenose dolphins, Tursiops truncatus. These studies have shown that not only can these dolphins survive in the waters at Bangor but that they can remain healthy and perform trained behaviors reliably. In addition to research conducted to answer cold water questions, an operational unit utilizing dolphins was deployed to Bangor in February 1985 to determine performance levels. The test results showed that the animals performed very successfully although the Navy has shown that we can move dolphins to Puget Sound and work them successfully, we have planned for adaptation with the group of dolphins that are to be moved there. These dolphins are now in San Diego in basic training. During their training, these animals will be trained so that core temperatures and blood samples can be taken. In addition blubber layer thickness will be monitored. Only animals in excellent health will be considered for transfer to Bangor.

Question. If it becomes clear that use of marine mammals at this location is endangering their health, will the Navy modify the program, relocate animals showing adverse effects, and possibly discontinue the mission?

Answer. The Navy handles dolphins on an individual basis. There is a small possibility that some of the dolphins moved to Bangor may not adapt well. We want to have only healthy, well-functioning animals at Bangor. The Navy veterinary staff will monitor the health of the dolphins closely and will treat any dolphins that may have trouble adapting. Animals that do not respond to treatment will be moved back to San Diego. The Navy will not intentionally harm these animals. If the Navy finds that it cannot maintain the health of enough animals to perform the mission, the deployment will be ended. We have every confidence, however, that this will not occur.

[CLERK'S NOTE. End of questions submitted by Mr. Dicks. Questions submitted by Mr. Hefner and the answers thereto follow:]

R&D PROCESS IMPROVEMENTS

Question. Mr. Secretary, I was impresssed with your comments about the problems you found in the R&D process and what you are doing to correct them. I believe we all agree that we must do a better job with the limited resources we can expect.

Is the Navy watching it's R&D programs to reduce or eliminate redundance?

Answer. We review all our Navy programs at least once a year. We examine program technical progress and execution compared to the plan submitted when the budget was first approved. During this review we look for any unnecessary duplication or redundancy. As each major or Don special interest program (ACAT I or II) is brought forward for a development mileston decision, the question is always asked, "is there another program in existence in either the Navy or any other service or organization (e.g., DARPA) or at one of our allies which would meet or could be modified to meet our requirements." If the answer is yes, we stop our initiative and either join in the development of or procurement of the system which meets or can be modified to meet our requirements.

Question. Is this coordination being done between the other services as well as within the Navy?

Answer. Yes, to some degree. We still have a way to go to become more efficient in this area.

Question. I understand you have a standards program to cut down on the number of different systems being fielded. Tell me something about this program. Has this program been successful?

Answer. The Navy has made significant strides in the utilization of standards. Two illustrations of this would be in the areas of airborne computers and radar warning receivers. The AYK-14 is the standard airborne computer for all of our tactical aircraft. In radar warning receivers we consolidated our requirements and initiatives to select one common receiver, the ALR-67, the single standard warning receiver for all Navy/Marine Corps tactical aircraft. There is another initiative that we have begun which is not exactly "standardization", but addresses the issue of commonality with the obvious benefits of cost reduction for aircraft procurement and spares. This is the initiative we took on common avionics elements between the AV-8B, F/A-18, F-14D and A-6E SWIP Program. This is further exemplified by the advanced avionics architecture development for commonality between the A-12, ATF and LHX aircraft.

Our "neckdown" program is a different initiative with similar benefits. In this initiative we started by addressing the air-to-surface weapons. The plan is to consolidate our resources by eliminating laser guided systems and developing the Advanced Interdiction Weapons System (AIWS). This system will replace the Laser Maverick, Laser Skipper and Walleye weapons with a single weapon system.

Question. For the record provide a list of those Navy programs designated as a standard and what is included in the 1990 budget to support them.

Answer.

[Dollars in thousands]

PE	Program	Fy 1990 budget request
0204163N	Fleet Telecommunications (Tac)	9,276
0303603N	Milstar Satellite Communications Sys	5,001
0603217N	Advanced A/C Subsystem	9,286
0603231N	Navy ATF	64,735
0603262N	A/C Survivability & Vulnerability	9,141
0603270N	EW Technology	12,830
0603513N	Shipboard System Comp Development	12,066
0603609N	Conventional Munitions	[1] 54,405
0604203N	Standard Avionics Development	15,841
0604211N	IFF System Development	26,337
0604215N	Support Equipment	63,071
0604255N	EW Simulator Development	38,276
0604264N	Aviation Life Support System	21,654
0604270N	EW Development	140,272
0604309N	Sea Lance	127,832
0604366N	Standard Missile Improvements	[1] 66,274
0604507N	Navy Standard Signal Processor	28,215
0604574N	Standard Embedded Computer Rsrcs	29,178
0604577N	EHF SATCOM	22,268
0604608N	Surface Electro-Optic System	17,030
0604609N	Bomb Fuze Improvement	19,000

[1] The MHIP program is a portion of both Conventional Munitions and Standard Missile Improvements Programs.

MINE WARFARE

Question. Navy testimony in the past has led us to believe we have a technology shortfall in the mine warfare area. Is this still true?

What happened to the Navy's plan of several years ago to develop a family of new generation mines?

Answer. We are currently examining program alternatives and acquisition plans. One preliminary plan is focused on conduct of a concept exploration effort to assess the feasibility of developing an ASW mine based on the CAPTOR ASW Mine System to satisfy both the ASM requirements and the requirement for additional deep water ASW mines capable against the future threat. This concept would use ——— thus reducing development and life cycle support costs while also providing greater operational flexibility. The concept ——— would also greatly improve system lethality against certain threat submarines.

Question. Are you satisified that sufficient funds are available for the Navy laboratories and the mine warfare industrial base to ensure that upgraded mines are available to counter the increasingly sophisticated Soviet submarine threat of the 1990's?

Answer. The Navy is currently reviewing its outyear mine development plans, including funding requirements, in view of the cancellation of the advanced sea mine program which was being conducted collaboratively with the United Kingdom. Specific funding requirements will result from this review. New mine development and upgrade of existing mines will be supported to the fullest extent within budget constraints.

Question. Are there current valid operational requirements in the Navy for both medium depth mine and the improved CAPTOR deep water mine?

Answer. Approved operational requirements currently exist within the Navy for both a medium depth mine and an improved captor mine. The operational requirement for the medium depth mine is in the form of the advanced sea mine which was being developed collaboratively with the United Kingdom. ———. The termination of the advanced sea mine program by the United Kingdom has necessitated a review of the advanced sea mine operational requirement and this review will be completed in the fall of 1989.

CAPTOR MINES

Question. With the estimate that one-third of the Soviet submarine force will be equipped with modern quieting technology within ten years, do you believe our arsenal of currently deployed CAPTOR mines are adequate to meet the increased Soviet threat?

Answer. No. The ongoing captor improvement program is designed to provide enhanced captor performance against the out-year threat.

Question. Would you comment on the status of the Navy's program to improve the warhead lethality and detection sensitivity of the CAPTOR mine?

Answer. The CAPTOR Improvement Program is underway. Technical investigations of potential improvement concepts are being conducted and initial preparations are in process for contractual activity initiation. Current activities are supported from a congressional plus-up in FY 1988 which is being carried over into FY 1989. Navy programmed CAPTOR improvement funding is scheduled to commence in FY 1990.

[CLERK'S NOTE.—End of questions submitted by Mr. Hefner. Questions submitted by Mr. Livingston and the answers thereto follow:]

FIBER-OPTIC GUIDED SKIPPER (FOG–S)

Question. The Navy has a program to evaluate the feasibility of using a fiber-optic tether on the Skipper bomb to give it increased range. What is the status of this effort?

Answer. The Fiber Optic Guided Skipper (FOG–S) technology demonstration is proceeding with proof of concept anticipated in FY 1990.

Question. Why are no funds included in the FY 1990 budget for it?

Answer. Initial planning called for the completion of demonstration within the $10 million appropriated by the Congress in FY 1989 and funds were not requested for FY 1990. With delay incurred in Congressional authorization to spend the funds, a slip in schedule was unavoidable.

Question. Last year the Navy testified that approximately $3.8 million in FY 1988 Skipper Enhancement appropriated program funds would be used for "a fiber optic demonstration with Skipper". In fiscal year 1989, both the House and the Senate Appropriations committees appropriated $10 million "solely for continued de-

velopment and completion of proof of principle for the fiber optic skipper".

What portion of the $10 million appropriated by Congress in fiscal year 1989 has been allocated or turned over to the fiber optic Skipper program?

Answer. In fiscal year 1989, $9.635 million has been allocated to the fiber optic Skipper program.

Question. Why hasn't the entire amount directed by Congress been turned over to this program? Provide details.

Answer. The difference between $10.0 million appropriated by the Congress and the $9.635 million released for execution is $0.365 million. This decrease consists of the following:

	Millions
Undistributed Congressional General Reduction	$0.043
OSD inflation reduction	0.072
OSD/NAVCOMPT Contractor Administration Support	0.001
OPNAV undistributed Below Threshold Reprogramming	0.026
Small Business Innovative Research	0.173
Retained in NAVAIR for management support	0.050
Total	0.365

Question. Is the $10 million appropriated in fiscal year 1989 (as well as previous funds allocated) enough to complete the proof of principle program for the fiber optic Skipper? If not, why not? Provide details.

Answer. As initially planned, the funds appropriated by the Congress were adequate to provide a demonstration of aircraft-launched fiber optic guided flight using FOG–M technology. Delay in Congressional authorization to spend the funds has resulted in an unavoidable slip in schedule.

Question. What additional funding, if any, is needed in fiscal year 1990 to complete proof of principle testing for the FOG–S? Please provide details.

Answer. The FOG–S technology demonstration will require $3.0 million in FY 1990 to complete the planned testing and cover costs resulting from the schedule slip.

Question. What is the Navy's current schedule for completing proof of principle testing of FOG–S?

Answer. The FOG–S program plans to complete an All up Round (AUR) guided flight test series by the end of FY 1990. All necessary hardware will be obtained in FY 1989 to support the assembly and flight test program scheduled for FY 1990.

Question. Provide for the record a breakdown, by fiscal year, of the funds actually allocated or turned over to date to the fiber optic Skipper program. In addition to direct appropriations, include a breakout of monies for each fiscal year that were reprogrammed or transferred from other programs to FOG–S. Provide the identical breakdown for monies reprogrammed or transferred from the FOG–S program to other programs. Please provide the identical information asked for above for the Skipper Laser Guided Training Round program.

Answer. The following is a breakdown, by fiscal year, of funds actually allocated to FOG–S unpowered LGTR.

[In millions of dollars]

	1986	1987	1988	1989
FOG–S	0	$2.700	$3.000	$9.635
LGTR	2,580	4.200	5.400	5.990

Reprogramming and transfer history.

FY 1986—No below threshold reprogramming action to add or delete funds for FOG–S and LGTR was taken.

FY 1987—No below threshold reprogramming action to add or delete funds for FOG–S and LGTR was taken.

FY 1988—On June 30, 1988 P.E. 0603222N was reduced by $0.300 million (BTR 88–110) and further reduced by $1.200 million (BTR 88–111). On August 23, 1988 P.E. 0603222N was increased by $1.300 million (BTR–132). These reprogramming actions resulted in a net decrease of $0.200 million which was applied equally to LGTR and FOG–S.

FY 1989—The FOG–S program was decreased $0.365 million through undistributed Congressional, OSD and Navy reductions, Small Business Innovative Research reduction, and management support retained in NAVAIR. No decreases have been applied to the LGTR program.

Question. What additional capabilities would a FOG-Skipper provide to the Navy?

Answer. Compared to existing Skipper II weapons, the Fiber Optic Guided Skipper (FOG–S) provides the Navy with the following weapon capabilities currently not available in the fleet:

(1) A secure, quiet (non-radiating) data link weapon.

(2) Broad band data link capable of two way simultaneous transmission that will support multi-mode seekers.

(3) All signal processing done in the control pod which is reusable.

(4) A man-in-the-loop system capable of non-line-of-sight, terrain mask launch.

(5) Lock up after launch with re-targeting if required.

(6) Slow weapon flight to maximize target identification.

(7) Real time re-targeting information.

(8) Increased standoff range over Skipper.

Question. How do these capabilities compare to the current inventory of Skippers and other similar assets of the Navy?

Answer. No existing system utilizes a Fiber Optic Data Link although the technology, if successfully demonstrated, has potential for application in the Advanced Interdiction Weapon System (AIWS), the Standoff Land Attack Missile (SLAM), or new weapons systems that might be designed. With the potential for these future applications, completion of the technology demonstration is desired. Of the capabilities listed in the previous answer, Walleye and SLAM have two way data link, pod processing, man-in-the-loop, lock up after launch, slow weapon flight, and real time retargeting capabilities. SLAM provide increased stand off range over Skipper.

LASER GUIDED TRAINING ROUND (LGTR)

Question. Mr. Secretary, for fiscal year 1990 the Congress appropriated $5.9 million specifically to continue development of the Laser Guided Training Round (LGTR).

Have those funds been obligated yet? If not, explain why not and tell us when they will be obligated.

Answer. Of $5.9 million appropriated for LGTR, all funds have been committed and transferred to Naval Weapons Center, China Lake, CA, to support the program. $0.5 million will be placed on contract in June 1989. The remaining funds to be obligated to contractual activity will be determined by the program option chosen.

Question. The Committee is advised that, based upon existing inventories of laser guided bombs, the Air Force may also have a need for the LGTR, and a larger procurement profile would reduce Navy's unit costs. Has the Navy contacted the Air Force, and if so, what resulted?

Answer. In 1987 the Navy contacted the Air Force concerning their participation in the Laser Guided Training Round Program. The Air Force preferred to defer a decision until LGTR was developed and hardware was ready to be procured.

Question. The Committee is also advised that for the second year in a row, the Navy has not requested RDT&E funds for the LGTR, even though the Navy program manager admits that funds are needed, that the contractor is performing well, and that the program is technically sound. How much funding is needed in FY 1990, and why didn't the Navy budget for it?

Answer. $7.7 million in FY 1990 and $5.5 million in FY 1991 would be needed to complete development of the unpowered LGTR. During 1988, when the FY 1990/91 budget submission was being prepared, it was anticipated that LGTR would be ready for production in FY 1990 and no RDT&E,N funds would be required.

Question. Isn't it odd that the Navy budgeted procurement funds for the LGTR when no funds were budgeted to complete development?

Answer. During 1988, when the FY 1990/91 budget submission was being prepared, it was anticipated that LGTR would be ready for production in FY 1990, therefore, procurement funds were budgeted.

Question. How would you recommend that we fund this program in FY 1990, in both RDT&E and procurement?

Answer. In FY 1990 $7.7 million would be required to continue development. No procurement funds would be necessary. However, based on production unit cost growth from $1300 as contained in the Operational Requirement to over $2600 per unpowered training round (5000 unit production run, constant FY 1986 dollars), delay in IOC from FY 1990 to FY 1992, and planned replacement of Laser Guided Weapons as part of the Navy's Strike/ASUW Master Plan, the most cost effective and desirable approach is to use existing inventory for training.

NAVAL OCEANOGRAPHY

Question. In a memorandum to the Chief of Naval Operations on July 17, 1984, Secretary of the Navy John Lehman called for imme-

diate action on 15 initiatives to improve Navy efforts in oceanography. Describe for the record what has been done regarding Navy policy on oceanography as a result of this memorandum.

Answer. In July 1984, the Secretary of the Navy issued a policy statement to enhance and revitalize the Navy's efforts in oceanography. Previous to that, in April 1984, the Chief of Naval Operations issued a policy statement reaffirming the Navy's commitment to a strong and effective Naval oceanography program. Together, these policy statements are indicative of the Navy's current and future commitment to a strong and vigorous oceanographic program. The Secretary of the Navy's policy identified 15 initiatives which have been or currently are being implemented. These initiatives included a reorganization for the Office of the Oceanographer of the Navy, strengthening the career path and training for oceanographer designated naval officers, establishment of Secretary of the Navy research chairs in oceanography, establishment of Secretary of the Navy graduate fellowships in oceanopgrahy within the ONR graduate fellowship program, increased support for remote sensing, constuction of a major oceanographic research ship, development of a long-range Navy oceanographic ship construction plan, establishment of an Institute for Naval Oceanography with focus on ocean modeling, procurement of Class VII super computers to support both research and operational modeling and forecast efforts, and optimized management and use of Navy deep submergence assets.

The Secretary of the Navy's policy statement is a considered, balanced approach to strengthening the Navy's overall oceanography program.

The specific responses to the SECNAV follow:

Initiative (1), dealing with retitling the 1800 designator from "Geophysics" to "Oceanography" has been completed.

For initiative (2), the Oceanographer of the Navy, a position which was, for a time, coded for an 1800 Flag officer, has been recoded as an Unrestricted Line two star billet to ensure the incumbent could bring tactical at-sea experience to this policy making position. The position of Commander, Naval Oceanography Command is now filled by an 1800 designator Flag officer to provide for a proper level of leadership at this vital operational oceanography headquarters.

Initiatives (3) and (4), dealing with establishment of an Oceanography designator and the reorganization of career paths and professional education for restricted and unrestricted line oceanographers, have been completed with some modifications. Unrestricted line Oceanographers from each of the four unrestricted line communities (1110, 1120, 1310, 1320) are selected for the XX49P Operational Oceanography Subspeciality and attend either the Naval Postgraduate School or the Massachusetts Institute of Technology/Woods Hole Oceanographic Institution (MIT/WHOI) to earn Master's of Science degrees in Oceanography or Ocean Engineering. These officers have a career path up to and including Flag. Similarly, the career path for 1800 designator restricted line Oceanographers has been modified and now includes the opportunity for advancement to Flag rank.

Initiative (5), calling for the Oceanographer to report directly to the Chief of Naval Operations has been completed. The Oceanographer of the Navy is a Director of a Staff Office (DSO) on the CNO's staff.

The expansion of the ONR Fellowship Program called for in initiative (6) has been accomplished. Five Secretary of the Navy Fellowships in Oceanography are typically awarded each year, at least one of which is awarded to a qualified Naval Officer.

Initiative (7), directing an increase in the number of academic chairs in Oceanography has been accomplished. The total number of academic chairs currently funded by ONR has increased by four to a total of seven. Starting in FY90, the Office of Naval Research has announced a new Ocean Science Educators Awards program to identify and support distinguished academic ocean scientists who have an excellent record of educating high quality doctoral and/or postdoctoral students and who will, under this program, draw postdoctoral scientists from other disciplines into the ocean sciences. By supporting such distinguished educators and attracting postdoctoral scientists into the ocean sciences, the Office of Naval Research intends to respond to a need identified by the ocean science community and to reiterate the Navy's commitment to excellence in oceanographic education and research.

The establishment of the Master's of Ocean Sciences program called for in initiative (8) has been accomplished. Up to eight Naval Officers attend MIT/WHOI each year to earn Master's degrees in either Oceanography or Ocean Engineering.

Initiative (9) is addressed in detail in the responses that follow. However, it should be said here that while the Navy's ocean science program focuses on the unique needs of the Navy, it nonetheless contributes to national efforts in oceanographic research. Clearly, some of the new initiatives resulting from the Secretary of the Navy policy statement contribute to, and are coordinated with, efforts of other federal agencies. For example, the Institute for Naval Oceanography emphasized the development and transition of oceanographic models to support the operational Navy, such as for ASW operations, but will be closely coupled to other agency programs and will include participation by academic scientists and institutions. In addition, the procurement of the super computer located at the Naval Oceanographic Office, which will be accessible by communications link, will provide a sorely needed facility for the developers of oceanographic models and databases. The center to house this computer has been completed and the procurement process is well underway. The ocean modeling effort will concentrate on time and space scales of importance to naval operations, such as mesoscale features and regional predictions, and will be an important complement to NSF's planned global circulation program. This initiative represents a balanced and integrated program in ocean modeling, remote sensing and experimental measurements. It will provide long-term benefits to the Navy and serve as a mechanism to integrate the various interests of NSF, NOAA, NASA and Navy.

Initiatives (10) and (11) were cancelled after it was determined that they were unaffordable at this time. In the case of N-ROSS, however, the need still exists for acquiring remotely sensed oceano-

graphic measurements from space. The Navy program for acquiring and incorporating space-sensed oceanographic and atmospheric information needed to support the development and execution of Navy strategy and tactics is broadly based. It spans the entire spectrum from basic research on phenomena to building sensors.

Initiatives (12) and (14) deal with oceanographic ship construction. First, the Secretary directed that Navy budget for the procurement of an oceanographic research ship to be utilized by the civilian academic research community with a trget completion date of 1991. This vessel is presently under construction in Pascagoula, MS. Additionally, the requirement for the development of a long-range plan for replacement of the Navy operated survey and research ships has been completed. The objective of this program is to ensure that appropriate deep ocean ships are available to meet Navy operational and research needs. At present four vessels are in various stages of construction with eight more planned through the FYDP. These efforts affirm the Navy's commitment to the provision of adequate facilities within Navy and in the academic community for deep water oceanography. The Navy has always viewed its oceanographic ships to be national assets. As such, the new research vessel and future ships will upgrade the national capability and ensure a modern oceanographic fleet capable of global operations. The Navy efforts in ship construction and replacement are being coordinated completely with NSF, UNOLS and the Federal Oceanographic Fleet Coordination Council.

Initiative (13), dealing with the Navy's deep submergence assets, has been accomplished. OP-23 has agreed to make up to 60 days per year available to the research community on SEA CLIFF and/or TURTLE. These provide the R&D community with a 20,000 foot dive capability.

Finally, to satisfy initiative (15), the Tech Base funds were plussed-up by $10 million in FY 1986. The Navy POM was also increased to reflect the new emphasis on Oceanography. Additionally, Navy policy since that time has provided more funds for ocean sciences than any other scientific discipline.

Question. What has been done regarding recommendation #9 regarding the Institute for Naval Oceanography? Provide details.

Answer. The Chief of Naval Research (OCNR) established the INO in October 1985 as a separate Activity within the Navy. To encourage academic involvement, the INO management function was transferred by ONR to the University Corporation for Atmospheric Research (UCAR) on 1 August 1986 through a cooperative agreement. The INO was subsequently disestablished as a naval activity. UCAR has been the manager of INO since that time. Initially, the issuance of Navy guidance (funding levels and Navy needs) to the INO was coordinated by the ONR Director of Ocean Science and Technology. In February 1988, by a Memorandum of Agreement, the Office of the Chief of Naval Research (ONR and ONT) and the Office of the Oceanographer of the Navy established the jointly-funded, vertically integrated (6.1 through 6.3) Navy Ocean Modeling and Prediction R&D Program (NOMP) to provide the Navy with a tactically useful ocean prediction capability. The participants in the program include the INO and NORDA, both located at the Stennis Space Center, Ms; the Naval Environmental Prediction

Research Facility (NEPRF), Monterey CA; and the ONR Research Programs Department. A manager was appointed in April 1988 to develop the program and provide it with technical oversight and accountability. A long range strategic plan for NOMP was prepared through joint involvement of the participants who provided the scientific and technical guidance for the development of the initial program plan.

In addition to providing the INO with an annual budget, the Navy has been taking steps to significantly increase the computational capability at the SSC. A VAX 8800, with a graphics reproduction capability, has been purchased and assigned to the INO. An 8-processor mini-supercomputer has been procured and assigned to NORDA and is being shared with the INO. Both the INO and NORDA are linked to the local area net, which also will be tied to the Class VII Large Scale Computer (LSC) scheduled to become operational in June 1990. Furthermore, both organizations are linked externally to all major U.S. Computer Centers through DoD, NSF, and NASA high speed computer networks. The Oceanographer of the Navy has been responsible for the LSC's procurement. A Memorandum of Agreement has been signed by the Oceanographer of the Navy and the Office of Naval Research to provide the mechanism for use of the LSC by the University community and Navy laboratories. Both the INO and NORDA have procured powerful SUN workstations for scientific staff use. Additionally, NORDA has procured a number of micro-processors that are identical to or emulate computers employed by Naval operational forces.

Question. What is the current mission of the Institute for Naval Oceanography (INO)?

Answer. To develop and demonstrate mesoscale eddy-resolving ocean prediction systems on a global basis.

The Institute approaches its goal by:

Fundamental studies of critical ocean processes and methodological issues, and how they affect the design of ocean models and prediction systems.

Model and data base development, comparisons, and evaluations, and their implications for the design of future ocean models, observing systems, and data assimilation strategies.

Development of data integration and assimilation methods, and their use in the design of data networks and ocean prediction systems.

Question. What is the importance of its work to the Navy?

Answer. The INO's work is extremely important, representing a unique component of the Navy's overall integrated mesoscale ocean prediction R&D effort. In collaboration with the Naval Ocean Research and Development Activity (NORDA), Stennis Space Center, Mississippi, the INO conducts its own basic and exploratory ocean research program using a resident scientific staff and acts as the Navy's primary interface with the University community for ocean modeling and prediction.

Question. Have the Director of Naval Oceanography and the Chief of Naval Research developed a joint program plan for the INO?

Answer. Yes, in that a Long Range Strategic Plan was jointly prepared by the R&D participants to define a vertically integrated, products oriented program in Navy mesocale ocean modeling and prediction. This plan, developed by the Naval Ocean Modeling and Prediction (NOMP) Program, identifies various R&D performing activities. The INO is included in the plan, as are the Naval Environmental Prediction Research Facility (NEPRF), Monterey, California; the Research Programs Department (RPD) of the Office of Naval Research (ONR); and NORDA.

The plan is updated every year by the NOMP Program Manager of ONR. This Long Range Strategic Plan is included as part of the annual guidance issued to the performing activities for preparation of R&D research implementation plans.

Question. When will this plan be completed?

Answer. The Long range plan was issued in draft form in May 1988 and distributed in final form in November 1988. the implementation plan was submitted in September 1988 for the FY 1989 program

Question. What are the Navy's long term plans for the INO?

Answer. The Navy (ASN (RE&S) and the VCNO) have approved the establishment of an integrated corporate Naval ocean sciences laboratory. The new corporate laboratory will be the integration of NORDA, NEPRF, and the INO into one organizational structure. The Navy is committed to the establishment of a first-rate prestigious organization that is equal in stature to the Naval Research Laboratory. The INO is needed to promote ties to academia and to assure that the best science and technology available is transferred to Naval capabilities. The new laboratory will enhance synergistic, collaborative R&D work because of improved central coordination of tasking. The INO will continue as a contractor-managed Navy organization and will be an integral component of this new laboratory. The INO will continue to conduct its own mesoscale ocean modeling and prediction research and continue to serve as a prime interface with the University community for mesoscale ocean modeling and prediction.

Question. Describe the impact, if any, of current or future plans for the Institute on its future budget or location.

Answer. The INO represents an integral component of the Navy's integrated environmental program. The presence of an INO at the SSC is essential to a successful Navy ocean and atmospheric modeling program because of its links to academia. Therefore, the Navy has no plans to move the INO. With regard to the budget, the Navy plans to increase the INO funding commensurate with inflation. If additional funding becomes available for the establishment of new ocean modeling initiatives, it is expected that the INO would be a viable competitor for such funds.

Question. What has the Navy done, or what plans are there, to position the INO so that it can be most effective in working with universities in the region as well as the existing Stennis Space Center institutions?

Answer. The INO participates in site reviews of ONR research programs nationwide. Within the Gulf Coast region there are strong ocean and atmospheric modeling programs at Florida State University, the University of Miami, and Texas A&M University.

In addition, there is a strong acoustics program at the Applied Research Laboratory of the University of Texas. The University of New Orleans has a small acoustics program being conducted by Dr. Joseph Murphy. The Navy is supporting the National Center for Physical Acoustics Research at the University of Mississippi. The INO has been encouraged to and has interacted with local and distant academic institutions to help the Navy in developing a strong program in ocean-atmospheric modeling. The INO is additionally working closely with NORDA and the Naval Oceanographic Office located at the Stennis Space Center in the development of a coordinated program.

Question. What relationships does the INO and the Naval Ocean Research and Development Activity (NORDA) have with university communities in Louisiana and Mississippi?

Answer. The INO has had significant interactions with: Mississippi State University; University of Mississippi; University of Southern Mississippi; Jackson State University; University of New Orleans; Tulane University; Xavier University; Louisiana State University; University of Southwestern Louisiana; and Louisiana Universities Marine Consortium.

These interactions have been in the form of visits to the campuses by INO staff, seminar visits at INO from university faculty, INO workshops held at Tulane University and University of Southern Mississippi's Gulf Park campus (one is planned for University of New Orleans), one sponsored research project at Tulane, INO hosting a UNO faculty member on sabbatical leave, INO hosting two Tulane faculty as visiting scientists, INO hiring a few black students as summer workers from Xavier University and Jackson State University, enrolling INO staff in University of Southern Mississippi's marine science courses, etc. The INO has been working with the universities identified with an asterisk to form Delta COAST. This non-profit Consortium promotes the cooperation and coordination of universities interested in research which is complementary to the institutions at the Stennis Space Center (SSC,) in order to help the latter develop interactive programs and indirectly help the SSC institutions in Naval Oceanography with their human resource development needs. It also hopes to promote the development and growth of additional private and public sector institutions in ocean and atmospheric sciences and technology in Mississippi and Louisiana for the mutual benefit of all the involved parties.

The NORDA program is must more diverse than that of the INO, since it includes several oceangraphic disciplines, and has led to a number of significant and healthy interactions. Working relationships between NORDA scientists and university faculty and students are strongly supported and endorsed by NORDA management. These relationships include faculty on ten week summer appointments at NORDA, faculty working as consultants and contractors on NORDA projects during the academic year, students working in formal co-op programs, and students working full-time during summers and part-time during the academic year. Several NORDA staff serve as adjunct professors with universities in Louisiana, Mississippi, Texas, and Florida, and have assisted universities in teaching specialized courses and in guiding the research of

graduate students. The following paragraphs explain relationships established between NORDA and Gulf Coast university faculty and students during the last twelve months:

a. Summer Faculty Fellowship Program.—NORDA, through the program managed by the American Society for Engineering Education for the Office of Naval Research, sponsors several ten-week university faculty assignments to NORDA each year. A number of these assignment go each year to faculty members in Louisiana and Mississippi universities. Summer faculty for the summer 1988 for Gulf Coast state universities included:

(1) Five Professors from the University of New Orleans working in acoustics, remote sensing, ocean engineering and artificial intelligence:

(2) Tulane University (Two Professors) working in marine biofouling, corrosion and laser optics;

(3) Jackson State University, Jackson, MS (One Professor) working in physical oceanography;

(4) University of Southern Mississippi (USM), Hattiesburg (Two Professors) working in acoustics; and

(5) Texas A&M University (One Professor) working in sediment fabrics.

b. Part-time consultant to NORDA.—NORDA has developed consultant and contractor relationships with several faculty of universities in the Gulf Coast states. The relationships developed during the summer faculty assignments have commonly turned into part-time consultant taskings to either refine or extend the summer work. Faculty consultant and contractor relationship include faculty from University of New Orleans, Tulane University, Louisiana State University, Xavier University, University of Southern Mississippi, Hattiesburg, University of South Alabama, Mobile, and Texas A&M University.

c. Co-op Students.—NORDA has strived to develop a co-operative study relationship with Gulf Coast universities and Louisiana and Mississippi universities in particular. NORDA now supports one undergraduate co-op student (female) with USM in Physics, and is in the process of starting support of two more co-op (both also female) in Physics and Computer Science. We have completed this year support of one co-op with UNO, who has received his Bachelors degree and is now a full time NORDA employee. NORDA is supporting one graduate student (Ph.D. candidate, female) with TAMU, in marine geology, sediment fabric and geoacoustics.

d. Summer and Part-Time Student Hires.—NORDA hires undergraduate and graduate level students from Louisiana and Mississippi universities for summer work and for part-time work while classes are in session. Fourteen full time student hires for Summer 1988 participated from the following universities: University of New Orleans, Tulane University, Southwestern Louisiana Univerisity, Mississippi State University, University of Southern Mississippi, and Jackson State University, Jackson, MS (ONR Historically Black College/University Program).

Sixteen part-time students during the last twelve months participated from the following universities: University of New Orleans, Tulane University, Louisiana State University, University of

Southern Mississippi, Pearl River Community College, MS, and Pearl River Votech.

In addition, three USM students are participating in a NORDA sponsored oceanographic cruise at this writing. NORDA solicits student participants in various oceanographic cruises, paying travel and per diem for the student. The student participates at technician or junior scientist level. The student benefits by using the cruise experience for university credit for a field/laboratory course.

Question. What plans are there, if any, for increasing activities between these universities, the INO and NORDA?

Answer. NORDA personnel are expected to improve existing and develop new professional and programmatic ties with the Gulf Coast university community, and in particular, the research community. This guidance is contained in the Performance Plan of each NORDA senior scientist and technical manager.

NORDA has endorsed and is supporting the proposal of the University of New Orleans, to establish an interdisciplinary doctoral degree program in Engineering and Applied Science. Such an interdisciplinary program will provide the opportunity for graduate level training in the mix of disciplines required of employees in the research and development environment of the Stennis Space Center (SSC), and in NORDA in particular. Further, holding some of these classes on the SSC would be a significant aid in helping NORDA employees toward improving their professional skills. NORDA and the INO are 1½ hours minimum commuting distance from the nearest center of graduate level education. This relatively large commute distance impacts adversely on the continuing education of individuals. Provision of such classes for NORDA/SSC scientist and engineers would be of benefit to UNO not only in expanding its education program, but also in providing cross fertilization to UNO researchers by identifying current areas of government research.

NORDA is presently developing a joint program with the National Center for Physical Acoustics (NCPA), affiliated with the University of Mississippi, Oxford. As a result of these ties to the NCPA, NORDA will be hosting a graduate student from the University of Mississippi this summer. This is expected to lead to the development of a moderate but healthy joint marine acoustic program with the NCPA/University of Mississippi.

NORDA is assembling a contractual arrangement whereby personnel from the Marine Minerals Research Institute, also affiliated with the University of Mississippi, will have access to specialized geoscience laboratory equipment in NORDA facilities. In exchange, NORDA projects will be given access to the university-owned R/V KIT JONES, operated out of Gulfport, at considerably reduced cost to NORDA.

These are but three recent examples of NORDA's continuing active commitment to improving its ties, and the Navy's ties, with the Gulf Coast university community.

INO plans to continue interactions as discussed in paragraph 10, with the universities of the region. It does hope to continue trying to induce the development of appropriate graduate degree and academic research programs at neighboring universities for the benefit

of SSC institutions and personnel. For example, the Unversity of New Orleans has recently launched CROSS, the Center for Research on Ocean and Space Science, and they are planning a flexible PhD program in Applied Physcis and Engineering Science to meet the needs at SSC, while the University of Southern Mississippi has started a Marine Science Program which aims to offer a PhD in a few years. INO hopes to continue to engender the development of Delta COAST over the course of the next year through a series of on-campus seminars and a faculty workshop to define a unique research program, possible in coastal ocean climate change, to engage the talents and interests of the participants.

Question. To what extent do you see such Navy/University links to be important in future research activities of these organizations?

Answer. The Navy and the INO continues to believe that an increased academic presence at the SSC is crucial to the ultimate success of all the institutions at the SSC. The best way to achieve this success is for several universities of the region to develop complementary graduate programs on campus to facilitate their interactions with SSC, and to have a first rate "instructional delivery facility (classroom, instructional labs, and faculty for these offices)" at SSC for use by engineers serving as adjunct faculty for these universities. This regional network of universities also must be complemented by, and interactive with, a national network of universities with graduate programs in ocean and atmospheric science and technology. The INO and NORDA, working from different perspectives, are providing the catalytic force to bring these university networks to bear on both the Naval Oceanography Program's research needs and the need for better educated personnel.

Question. Provide a breakdown for every fiscal year, by program element and both budgeted and appropriated funds, of the monies dedicated to the INO. Also provide a brief summary of the purpose of the funding each year. Please include the FY 1990 funding.

Answer.

[Funding in thousands of dollars]

	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990
PE-61153N	300	2,550	2,500	2,200	2,200
PE-62435N		229	774	800	800
PE-63207N			200	(2)	
PE-63785N			300	(2)	500
Total	300	2,779	3,774	3,000	3,500

[1] There is no separate appropriation for the INO hence only the budgeted amount is shown.
[2] Program restructured in FY 1989 to better focus on the development of a nowcast/forecast model having operational utility.

INO Program Chronology (By Fiscal Year):

FY 1986.—Funds provided in Sept 86 for the spin-up of the INO

FY 1987.—The ONR-UCAR cooperative agreement of September 1986 specified that the INO will initiate, plan, and conduct a broad based research and development program in ocean modeling that will directly contribute to increased knowledge, understanding and prediction capability of the ocean in support of Naval missions. The

Navy objective was to establish a first rate modeling capability at the Stennis Space Center.

In pursuit of its mission the INO established a core in-house program through five scientific hires who conducted modeling studies of the Gulf Stream and the California current. The program was later expanded to include North Pacific and Global models, to address more completely issues associated with the interface to acoustic models, and the initiation of a contract research program with a number of academicians. Initally, this program focused on the development and the evaluation of existing North Atlantic models and on the development of data assimilation methods for their use.

FY 1988.— INO was successful in attracting seven additional scientists as part of a nationwide recruitment program. These scientists, in general, lacked modeling experience and consequently, INO ties to major universities having modeling expertise became of paramount importance.

INO therefore concentrated about 25% of its program in funding of academic investigators having interest in collaborative programs. The program included the development of North Atlantic, North Pacific, Global and shallow water models; the establishment of a center for the conduct of ocean simulation experiments; and the conduct of ocean seminars and workshops. The program attracted a number of the nation's best ocean modelers who worked at their respective institutions but in collaboration with INO scientists.

FY 1989 & 1990.—Through mutual agreement between UCAR and the Navy, the INO program was restructured to provide focus on achievable objectives within the constraints of available resources. The program context includes the development and evaluation of models for the North Atlantic and the development of a model evaluation capability (Experimental Center for Mesoscale Ocean Prediction (ECMOP)), which will function through the class VII Large Scale Computer to be installed at the SSC in FY 1990. The INO plan for FY 1990 and beyond includes the demonstration of a basin scale modeling predictive capability for the North Atlantic oceans and the employment of the ECMOP for conducting this demonstration. Interaction with the academic community will remain a high priority, although the number of workshops will be scaled down.

SEA LAUNCH AND RECOVERY (SEALAR) PROGRAM

Question. Briefly describe the SEALAR program.

Answer. SEALAR is a technology demonstration to investigate potentially cheaper space launch methods. The conceptual reusable rocket would use liquid propellants in a two stage to orbit vehicle, with a single pressure-fed engine (PFE) per stage. This concept fits a class of vehicles often referred to as a "big dumb booster" (BDB). These rockets are designed to be launched, free-floating vertically from the ocean and to be subsequently recovered in the ocean to be reused.

Question. What is the purpose of this program?

Answer. To develop a low-cost, more surviable, scalable space launch system.

Question. What is the current status of this program?

Answer. Currently, we are testing smaller-scale rockets of a similar design to establish feasibility and validate the design concept.

Question. List the program element or elements under which SEALAR is funded.

Answer. The Navy has not yet been able to identify funding for SEALAR for FY 90/91.

Question. What are the Navy's plans for funding this program in FY 1990 and beyond?

Answer. Navy is exploring the possibility of a jointly-funded program with other government agencies. These explorations are at a preliminary stage.

[CLERK'S NOTE.—End of questions submitted by Mr. Livingston. Questions submitted for the record and the answers thereto follow:]

MANAGEMENT AND ORGANIZATION OF ASW TECHNOLOGY DEVELOPMENT

Question. Recent studies of the Defense Science Board (1987) and the House Armed Services Committee (1989) severely criticized the "platform-specific" organization of the Navy as it relates to Antisubmarine Warfare (ASW) R&D. The House Armed Services Committee called the Navy's proposed organizational changes "embroidering the organization chart, rather than attacking the root problem" of why the Navy's most serious challenge is of a lower priority than business-as-usual issues. What changes will you make to this reorganization to give this central ASW structure more direct budgetary and program control over the full spectrum of ASW RDT&E programs?

Answer. The current organizational structure is considered adequate. The Director, ASW Development, on the Secretary of the Navy's staff has sufficient control through his resource sponsorship of all 6.2 and selected 6.3 ASW programs. As resource sponsor, he will control directly the content and thrust of each program assigned. For all other 6.1 through 6.4 ASW program, the Director, ASW Development will exercise oversight, review, and coordination authority, including "chops" on program reviews and restructurings, Navy Program Decision Meetings (NPDMs), etc., as well as an RDT&E,N funds deferral authority for exercise when considered appropriate. In this way, the Director, ASW Development will be able to influence and direct when necessary, the Navy's total investment in ASW technology.

Question. Given the call for a national program in ASW, and Navy's apparent inability to reorganize itself to address the problem, the Congress may consider consolidating ASW RDT&E into a single program in the Office of the Secretary of Defense. How would the Navy respond to such an approach and why? Does the Navy have a better solution to offer?

Answer. The Navy has reorganized itself already to address the future ASW threat. Accordingly, consolidation into a single program within the Office of the Secretary of Defense is considered unnecessary and duplicative.

The Navy reorganization installed a Director, ASW Development, on the Staff of the Secretary of the Navy. This official is the resource sponsor for all 6.2 and selected 6.3 ASW-related programs. The Director, ASW Development, has wide-ranging powers to

vector, divert, or stop the current direction of ASW developmental thrusts to conform to those most promising paths to improve fleet ASW capabilities.

ASW ARCHITECTURE

Question. The Armed Services Committee's report also discussed the need for "an entirely new and aggressive architecture for coping with this immensely serious development." In your view, how long would such an effort take, what would be its scope, and what funding would be required?

Answer. The Navy respectfully disagrees with the Committee's report. Studies of the requisite Navy ASW architecture have been ongoing for several years. Results of these studies have already been factored into the existing architecture. Systems developments already underway have been modified to respond to the required capabilities. ASW warfare systems architecture studies are currently funded at a level of approximately $5 million per year.

INNOVATIVE APPROACHES TO ASW

Question. According to Navy budget documents, only $525 million is budgeted in FY 1990 for ASW work prior to full-scale development. More than 75% of Navy's planned funding is for systems already in FSD. Yet according to Navy and Congressional studies, serious ASW deficiencies will remain even after these systems are fielded. In the words of the House Armed Services Committee, "dramatic new initiatives are essential . . . We believe that the Navy must, in effect, start over with new approaches to ASW." If additional funding were available, what specific technologies should be pursued and why?

Answer. The following technologies would be pursued:

a. Target Measurement Techniques.—In order to collect much needed target strength data from threat targets.

b. Target Acoustic "Imaging."—In order to ensure satisfactory placement of torpedoes along the targets's hull.

c. Non-Acoustic Methods.—Magnetics, ——— etc. in order to supplement Navy's reliance on passive methods up to now.

d. Mesoscale Oceanographics.—In order to understand better large scale disturbances to the ocean's water column.

e. High Gain Initiative.—In order to prove the theoretical mathematical concepts and to build a representative test array.

f. Advanced Torpedo Technology.—In order to stimulate research efforts into deeper, faster, and more countermeasures-resistant ASW torpedoes.

g. ASW C^3I.—In order to ensure sufficient data links capable of transmitting and receiving ASW threat data are available to U.S. ASW forces.

Question. The House Armed Services Committee's report concluded that "especially in the area of submarine technology, the Navy's effort is still too narrowly concentrated on the near-term (*i.e.*, the SSN-21), to the neglect of even greater longer-term improvements." What is the Navy doing to address this problem?

Answer. In addressing the future designs and capabilities of submarines, the Navy has had an ongoing program at Navy laborato-

ries and various industries which has been addressing improvements that are so revolutionary in nature that they would require major new redesign of submarines. Some of these technologies are very promising, but they are not just around the corner. They will take a concerted effort to establish a seed R&D program that will foster these technologies from theory to actual at-sea operation.

To centralize submarine advanced research and development, in August 1988, the Navy established an office in NAVSEA solely responsible for developing near-term and long-range integrated programs for submarine R&D. The Office of Advanced Research and Development (SEA–92R), headed by a flag officer (Rear Admiral T.W. Evans), is responsible for coordinating all submarine advanced R&D.

Moreover, the Navy has dedicated a 688 fast attack submarine to shorten the development time and reduce R&D cost by providing rapid prototyping of promising R&D projects. An interim R&D submarine, the USS MEMPHIS, will provide rapid prototype testing of current technology. In FY 94, an SSN 688 submarine will receive major modifications during a regularly scheduled refueling overhaul to test several significant R&D efforts of Navy and the DARPA Advanced Submarine Technology programs.

DARPA has long provided the nation with advanced research and development. The Navy laboratories have done the same. The two organizations are not in competition for scarce resources. The Navy has established another front on the edge of technology with DARPA. The cooperation of the laboratories and DARPA will ensure the most promising technologies are available to the submarine force.

SUBMARINE LASER COMMUNICATIONS

Question. Admiral, this Committee has long supported attempts to develop a laser communications capability for submarines. This program started at DARPA in the late 1970's but has floundered over the last few years due to budget constraints. However, we now understand that the Navy and DARPA have reached an agreement on a restructured program. Could you tell us what that program is, and why the Navy now supports it?

Answer. The new Navy/DARPA program is a three year effort which combines our laser communications resources to accelerate our ability to build and deploy a viable, cost-effective system. This effort will complete the Congressionally mandated demonstration of aircraft-borne two-way laser communications while also developing the key technology and systems engineering data required before we can proceed further.

The program includes five major task areas. Technical work conducted in any area will be coordinated with the others in such a way as to obtain the maximum technical advantage for both satellite and airborne program options. The first area is the two-way airborne demonstration. It will develop and demonstrate two varieties of laser transmitter and receiver, conduct a full field demonstration, and perform key modification and integration tests for a High Altitude Long Endurance (HALE) aircraft option. The second area will assess and develop other key laser and receiver technol-

ogies considered most likely to yield cost-effective system options and specifically provides for risk reduction work on the Xenon-Chloride (XeCl) option. A third area assesses the feasibility of Low Probability of Intercept (LPI) uplink communications from the submarine, and includes early exploration of new innovative concepts for two-way satellite laser communications. A fourth area will characterize the transmission path from space to a submerged submarine, including high grazing angles, using a green solid state laser aboard the Space Shuttle in conjunction with an SDI experiment. The fifth area will conduct systems engineering studies emphasizing cost/schedule/risk-versus-performance trade-offs from a systems contractor's perspective for several operational and technical options.

The Navy supports this program because it effectively addresses all key decision areas through efficient use of existing and budgeted funds over a three year period. It will develop required data, examine a number or rapidly emerging laser transmitter and receiver options with promise for greatly reducing system costs, reveal whether cost effective system options currently exist, and allow an informed decision to be made as to the best technical and operational direction for future development.

FUTURE ROLES AND MISSIONS OF SUBMARINES

Question. Mr. Secretary, the submarine has inherent advantages of stealth, mobility, and firepower. For that reason, discussions are now underway to expand the current missions of our submarine force into broader areas than ASW or the strike capability that we have today. Some studies have suggested that the US should move into a "mixed fleet" concept for submarines, with a mix of highly-capable general purpose ships and single-mission ships such as cruise missile submarines.

What are your views on this matter, and when will we know what the Navy's conclusions are?

Answer. The required mix of US submarines is driven by several factors. The attack submarine is expected to play a prominent role in the successful execution of the US maritime strategy. The combination of stealth, endurance, firepower and mobility enable the submarine to vigorously carry the fight to an enemy in his home waters, and to sustain the fight against the enemy's most capable forces. In this forward area US SSNs face a numerically superior force and will encounter all of the enemy's ASW assets. To achieve our goals, the US force must be sufficiently superior to successfully carry out these most important missions. In this light, the US has chosen to produce superior multi-mission submarines and to adapt those ships to take on some additional missions. Fiscal constraints prevent drawing scarce resource away from these existing programs of limited general utility.

ASW WEAPONS, SENSORS, AND C3

Question. In 1988, the Naval Research Advisory Committee reached a number of disturbing conclusions about our ASW capability. I'd like to read some brief quotes from that report and have you respond to each in turn.———?

Answer. ——— (1) Navy concurs that communications are fragile and is pursuing the following corrective actions and programs:

Navy fully supports the Joint MILSTAR program which is funded and managed by the USAF. Illustrative of Navy support is the status of our terminal program (a radio which will communicate through the MILSTAR and other EHF satellites). The Navy terminal is ready for limited rate production having passed initial testing with flying colors. Navy will go to production sufficiently in advance of the launch of the MILSTAR satellite and will be ready to use the satellite as soon as it is available. Recognizing the limitations in capacity of the MILSTAR system and its orientation toward National Command Authority and strategic use, Navy is actively pursuing the addition of EHF capability to the UHF Follow-On Satellite program to give the secure, jam resistant tactical circuits required.

In the same way, Navy fully supports the JTIDS program; again, this is an USAF managed program. The Navy plans to integrate JTIDS into as many ship and aircraft platforms as funding will allow. Navy recognizes the capability provided by JTIDS and is committed to it.

The HFAJ program was cancelled at the end of the first phase of the full scale development because the program was not affordable. Certainly Navy would like to have this capability and recognizes what it brings to the battle; however, other means of communication received higher priority.

Recently, Navy and DARPA signed a memorandum of agreement on Submarine Laser Communications which allows both agencies to pool limited resources which will be expended over a three year period (FY 1989, 1990, 1991) in an efficient, coordinated plan. The effort conducts critical experiments necessary to move toward a space based laser communications program while addressing the aircraft-borne facet. A SLCAIR-like system will be built and demonstrated as part of that effort and will provide the necessary groundwork to allow rapid development as a stepping stone to SLC or as a limited utility system if the demonstration results and system trade-offs so warrant. The essential elements of the agreements are as follows:

Two-way, aircraft-borne, Submarine Laser Communications demonstration, which is also applicable to High Altitude Long Endurance (HALE) application.

Technology exploration and development of key components with emphasis on rapidly emerging solid state laser options.

Space shuttle to submerged submarine demonstration using a green solid state laser.

Research on Low Probability of Intercept (LPI) methods.

Systems Engineering Studies by three major spacecraft prime contractors to identify system cost drivers and tradeoffs.

On completion of this effort, we expect to be able to make a determination of whether a space-based laser communication system to facilitate communications with submerged submarines is affordable and achievable, as well as whether an airborne system is cost-effective. ———.

(2) New Submarine Combat Systems under development for the SSN–688I Class and the SSN–21 Class include the development of

advanced Combat Control, Acoustic subsystems which will provide enhanced active and passive performance over existing submarine sonar systems. The AN/BSY-1 Submarine Combat System on the SSN-688I class includes the TB-23 Thin Line Towed Array which has ———. The AN/BSY-2 Submarine Combat System on the SSN-21 Class will have a Thin Line Towed Array which has ———. These increased aperture arrays provide lower frequency coverage, increased detection performance, and better localization due to narrower beams. The towed array on the SSN-21 Class will also provide a ——— which is being installed in the SSN-21 Class and some SSN-688 Class ships. ———. These developments will keep our ASW efforts ahead of the evolving threat for the foreseeable future.

(3) In response to the significant improvements that we have observed and are projecting for the Soviet submarine threat, Navy is developing the AN/SQS-53C Sonar System, the AN/SQS-89 Improved ASW Combat System for surface combatants and the Airborne Low Frequency Active Sonar (ALFS) to be carried aboard helicopters.

The AN/SQS-53C Sonar System is a high power, medium frequency ——— active sonar that is designed to provide the fleet with significant direct acoustic path protection against the future threat. The AN/SQQ-89 Improved ASW Combat System is a ——— active sonar system that is designed to give a ——— for the Block III variant and the same probability of detection in the ——— for the Block II variant. These two systems take advantage of high gain ——— technology for the receive subsystems. Because these systems exploit a ——— they are not so affected by threat quieting nor ———.

The ALFS system represents a significant improvement over current airborne sonar systems. It is relatively low frequency ——— and is designed to be carried by the SH-60 airframe currently in the fleet. As all of the surface combatants will be capable of embarking, or at least supporting, this aircraft, this will add considerable flexibility to inter-zone active detection.

All of these systems are to be used in support of battle group operations and protection of shipping role. In the case of response to hand over from some form of alertment, these systems will be effective in the reacquisition process.

(4) The Navy is actively investigating non-acoustic techniques as a potential means to combat the decreased opportunity for passive sonar detections of Soviet submarines as a result of Soviet quieting efforts. ———. Although none of these techniques will result in making the oceans transparent to submarines, their use together or in some combination with acoustic detection methods have the potential to regain some of the detection capabilities lost with the increased quieting of Soviet submarines.

(5) The Integrated Undersea Surveillance System (IUSS) has traditionally been based primarily on passive capabilities, ———. As the significantly quieter threat emerges, the role of underwater acoustics must shift to new areas to exploit. ———.

(6) The Long Range Air ASW Capability Aircraft (LRAACA) and P-3C Update IV avionics system are Maritime Patrol Aviation (MPA) initiatives that counter the quieter, faster Soviet threat and

improve ASW/ASUW war fighting capabilities. The Update IV system has a distributive bus architecture that allows significantly increased processing power while accepting high data rate sensors, and improves aircraft survivability. LRAACA, with Update IV, substantially increases operational flexibility through greater payload and range at increased speed and improve onstation time, and has substantial growth for future requirements. A two-phased P^3 I program for Update IV has been established ———.

(1) The MK-48 ADCAP completed OPEVAL in FY 1988, was introduced into the Fleet in August 1988, and was approved for Full Production on 23 January 1989. ADCAP as currently configured represents a significant improvement over current MK-48 capabilities and will improve the effectiveness of SSN-688 and SSN-21 Class submarines. ———. Additionally, planned software upgrades to the torpedo Guidance and Control (G&C) unit will be made to provide significant improvements in torpedo performance. The programmed improvements will further enhance the effectiveness of a MK-48 ADCAP equipped submarine. Additionally, the Office of Naval Technology has advanced technology projects under investigation to develop the next generation heavy-weight torpedo, including projects in ———.

(2) The MK-50 program was instituted to increase performance beyond that of the MK-46 Mod 5 in order to maintain a high mission abort probability against the evolving threat. The MK-50 torpedo is required to counter the same submarine threat as that identified for ADCAP; however, it is tailored to aircraft, helicopter, missile delivery, and surface ship operational factors. The limited volume available in lightweight torpedoes requires tradeoffs for each performance characteristic. The propulsion system is specified to provide sufficient speed and endurance to pursue high-speed evading targets at ranges consistent with the expected detection ranges in the air-delivered mode. ———. The MK-50 has been in full-scale engineering development since January 1984. The propulsion system, sonar, command and SECRET control, and warhead have achieved the system design performance objectives. Production prototype torpedoes have commenced system performance testing and engineering qualification trials, with OPEVAL scheduled to commence in December 1989. IOC is scheduled for ———. Phase III of the SSTD program consists of a joint program with the U.K. The MOU to initiate this program was signed in October 1988. The structure of this phase will depend on the results of a joint feasibility study and lead to a D&V phase initiation in FY 1990. Inputs to the feasibility study are top-down analyses currently in progress in each country.

(4) Other ASW weapons under development include the Interim Vertical Launch ASROC (with MK-46 torpedo payload) and the SEA LANCE (with MK-50 torpedo payload) stand off weapon.

Question. For the record, please explain what programs are in place to implement the recommendations of this report (NRAC #88-3), and provide associated funding and schedule data.

Answer. The Key Recommendations of the Naval Research Advisory Committee *Report on the Outer ASW Battle (AAW-ASW Analogy)*, January, 1988 (NRAC 88-3), which are listed on page 66 of that report, are addressed below.

(1) Correct Communications Fragility

Navy is pursuing the following actions/programs to minimize communications fragility:

Navy fully supports the Joint MILSTAR program which is funded and managed by the USAF. Illustrative of Navy support is the status of our terminal program (a radio which will communicate through the MILSTAR and other EHF satellites). The Navy terminal is ready for limited rate production having passed initial testing with flying colors. Navy will go to production sufficiently in advance of the launch of the MILSTAR satellite and will be ready to use the satellite as soon as it is available. Recognizing the limitations in capacity of the MILSTAR system and its orientation toward National Command Authority and strategic use, Navy is actively pursuing the addition of EHF capability on our UHF Follow-On Satellite program to give us the secure, jam resistant tactical circuits required.

In the same way, Navy fully supports the JTIDS program; again this is an USAF managed program. The Navy plans to integrate JTIDS into as many ship and aircraft platforms as funding will allow. Navy recognizes the capability provided by JTIDS and is committed to it.

The HFAJ program, which the NRAC recommended using for beyond line of sight, was cancelled at the end of the first phase of the full scale development because the program was not affordable. Certainly Navy would like to have this capability and recognizes what it brings to the battle; however, when required to prioritize for fiscal reasons, other means of communication received higher priority.

Recently, Navy and DARPA signed a memorandum of agreement on Submarine Laser Communications which allows both agencies to pool limited resourcese which will be expended over a three year period (FY 1989, 1990, 1991) in an efficient, coordinated plan. The effort conducts critical experiments necessary to move toward a space based laser communications program while addressing the aircraft-borne facet. A SLCAIR-like system will be build and demonstrated as part of that effort and will provide the necessary groundwork to allow rapid development as a stepping stone to SLC or as a limited utility system if the demonstration results and system tradeoffs are as follows:

Two-way, Aircraft-borne, Submarine Laser Communications demonstration, which is also applicable to High Altitude Long Endurance (HALE) application.

Technology exploration and development of key components with emphasis on rapidly emerging solid state laser options.

Space shuttle to submerged submarine demonstration using a green solid state laser.

Research on Low Probability of Intercept (LPI) methods.

Systems Engineering Studies by three major spacecraft prime contractors to identify system cost drivers and tradeoffs.

On completion of this effort, we expect to be able to make a determination of whether a spaced based laser communication system to facilitate communications with submerged submarines is afford-

able and achievable, as well as whether an airborne system is cost-effective.

RDT&E FUNDING AND SCHEDULE DATA

[in millions]

Program title	Fiscal year—			[DELETED.]
	1989	1990	1991	
Navy EHF terminal:				
(MILSTAR)	27.4	20.3	17.9	[DELETED.]
JTIDS	114.6	96.6	79.8	[DELETED.]
SLC	25.3	2.0	1.8	[DELETED.]

(2) Implement Fusion at Battle Manager

Navy recognizes the vulnerability of shore nodes and the desirability to provide local fusion. This is an area where we are moving carefully. Overreaction would be counter-productive. Before we go too far with this concept, it is necessary to have a complete architectural view of where we are headed. Navy has a team of technical experts and operators who meet regularly to work within the framework of the Warfare Systems Architecture and Engineering Program to identify our future total Command, Control, Communications and Intelligence architecture. This will identify programs which are required to meet the information needs of the future and includes identification of fusion centers. At present, we are developing the ability to provide direct input to Battle Group Commanders and Fleet Commanders from selected off board sensors. Additionally, there are Fleet initiatives to transport current fusion systems ashore from commanders afloat. One effort will test the use of the OSIS Baseline Upgrade (OBU) software on one of the Navy's command ships. Because OBU offers security features not common to most command and control systems, this effort will enable data link connection with some of our National sensors systems. This information is being integrated into the organic picture through the Afloat Correlation System (ACS). Because of funding deficiencies, the Navy is restructuring the Afloat Correlation System (ACS) and Electronic Warfare Coordinator Module (EWCM) projects by combining these efforts with the Tactical Flag Command Center/Flag Data Display System (TFCC/FDDS) development. This restructured program will enable the fielding of the system which will fuse both the non-organic and organic information for the battle group commander.

RDT&E FUNDING AND SCHEDULE DATA

[RDT&N—dollars in millions]

Program title	Fiscal year—			[Deleted]
	1989	1990	1991	
Afloat correlation system	11.6	8.3	5.8	[Deleted.]
Tactical Flag command center (TFCC)	2.3	2.5	1.0	[Deleted.]
Electronic Warfare Coordinator Module	4.2	2.9	1.0	[Deleted.]

RDT&E FUNDING AND SCHEDULE DATA—Continued

[RDT&N—dollars in millions]

Program title	Fiscal year—			[Deleted]
	1989	1990	1991	
Warfare Systems, Architecture and Engineering	6.8	9.4	13.0	[Deleted.]

(3) Develop High Speed, Long Range Sow

Navy currently is developing a common ASW Standoff Weapon (SOW) for both surface ships and submarines. The SEA LANCE is a supersonic ASW missile which will carry a MK-50 Torpedo payload at operational distances up to ——— miles and can be launched from submarine torpedo tubes or from surface ships equipped with the MK-41 Vertical Launch System (VLS). The SEA LANCE has been designed to be configured with a Nuclear Depth Bomb as an optional payload. The SEA LANCE Service Life Plan includes potential block upgrades to maintain weapon operational validity against evolving improved capability threats and to extend the stockpile life of SEA LANCE to at least 40 years.

RDT&E Funding and schedule data

Sea Lance (Surface) (Submarine):	*millions*
Fiscal year—	
1989	$79.3
1990	127.8
1991	139.9
IOC	[Deleted.]

(4) Develop Quiet Launch, Quiet Run Torpedo

There are two separate efforts underway in Navy; one to develop a quiet torpedo and a second to develop a quiet launch system.

The Heavyweight Torpedo quieting improvements were started in FY 1987 with a projected IOC of ———. This effort consists of developing a direct replacement for the ADCAP ———.

RDT&E Funding and schedule data (for the Closed Cycle ADCAP Propulsion System (CCAPS):

FY 1989, $23.0 million; FY 1990, $36.4 million; FY 1991, $49.6 million; IOC, ———.

The quiet torpedo launch effort is being conducted in Advanced Submarine Technology (6.2 funding) Block Program by the Office of Naval Technology. This effort is directed at providing technology to launch torpedoes at higher submarine speeds with reduced transient noise. Current efforts include development of ———. A laboratory model has been demonstrated and a full size auxiliary internal ——— was demonstrated in FY 1989. This effort is ready to transition to an Avanced Technology Demonstration program.

RDT&E funding and schedule data.—FY 89, $1.045 million; FY 90, $0.685 million; FY 91, $0.800 million.

Milestones. ———.

(5) Pursue Effective ASW Self Defense for Surface Ships and Submarines

Navy has initiated ASW self defense program for both surface vessel and submarine platforms. ———. Phase III of the SSTD program consists of a joint program with the U.K. The MOU to initiate this program was signed in October 1988. The structure of this phase will depend on the results of a joint feasibility study and lead to a D&V phase initation in FY1991. Inputs to the feasibility study are top-down analyses currently in progress in each country. ———.

RDT&E FUNDING AND SCHEDULE DATA [1]

[Dollars in millions]

Program title	Fiscal year—		
	1989	1990	1991
National program	33.7	39.7	35.1
Phase I&II joint United States/United Kingdom	[1] 7.0	11.8	17.9

[1] NUNN Funding.

SSTD Phase I ———.
SSTD Phase II ———.

SSTD Phase III

Signed United States/United Kingdom	26 October 1988
Begin concept evaluation	FY 1989
Begin D&V	FY 1991
Begin FSED	FY 1994
IOC	Deleted.

In 1987, Navy initiated two efforts to provide increased ASW self-defense for submarines. The first effort was initiation of a 5-year Submarine Torpedo Defense (SMTD) project under the Balanced Technology Initiatives (BTI) program. This project is designed primarily to conduct rapid prototyping of two advanced demonstration (ADM) vehicles for in-water testing to demonstrate the feasibility of a rapid fire, hardkill anti-torpedo system. Technical issues to be resolved by these in-water tests include ———. Additional efforts will be undertaken to examine alternate systems, resolve testing issues and prepare for Full Scale Engineering Development of the selected system.

RDT&E Funding and schedule data.—FY 1989 $7.7 million; FY 1990, $19.3 million; and FY 1991 $12.0 million.

Milestones.—Complete ADM fabrication, March 1989; Conduct in-water testing, September 1989; Conduct fuse and safing/arming tests, FY 1990; Repackage system in 6.25 inch diameter vehicle and test, FY 1990; and Transition to 6.3 funding, FY 1991.

The second effort initiated in FY 1987 was a study conducted by CNA to examine the submarine-launched countermeasures program. As a result of this study the Navy developed funding and programmatic requirements which were included in the FY 1990/91 budget. The required Tentative Operational Requirements/Operational Requirements are in place for development of acoustic sonar and torpedo countermeasure devices ———.

RDT&E FUNDING AND SCHEDULE DATA

	Fiscal years—	
	1990	1991
Mobile Multifunction Device	$2.35	$5.4
Sonobuoy RF Countermeasure	1.84	2.4
Submarine Torpedo Defense (Note 1)	0	2.8
Sonar Advanced Countermeasure	0	0.4
Command/Control Unit	2.6	3.9

Note 1. Additional funding contained in BTI program as discussed above.

MILESTONES

[In fiscal years]

	M/S I	M/S II	M/S III	IOC
Mobile Multifunct. Dev.	1990	1993	1993	[Deleted]
Sonobuoy RF C/M	1990	1992	1996	[Deleted]
Sub. Torpedo Defense	1991	1996	1998	[Deleted]
Sonar Advanced C/M	1991	1994	1999	[Deleted]
Command/Control Unit	1990	1993	1996	[Deleted]

(6) *Develop High Gain Reacquisition Sensor.*—The Navy has recognized that initial detection will continue to be the critical step in ASW. As a result, the development plan for Undersea Surveillance Systems is structured to achieve two primary goals: ———.

The plan will also introduce Fixed Distributed Systems (FDS) to ———. The Advanced Deployable System (ADS) represents a new class of underwater surveillance system. While functionally similar to the Fixed Distributed System (FDS) ———.

RDT&E FUNDING AND SCHEDULE DATA

[In millions of dollars]

Program title	Fiscal years—			
	1989	1990	1991	IOC
SOSUS	1.0	11.0	17.2	Upgrades underway
SURTASS	15.0	20.2	13.5	FY84 w/ upgrades
FDS	103.8	160.1	204.5	[Deleted]
ADS (Funding addressed in POM-92)				Approximately
SDS	N/A	5.2	6.8	[Deleted]

The AN/SQS-53C Sonar System is a high power, medium frequency ——— active sonar that is designed to provide the fleet with significant direct acoustic path protection against the future threat. The AN/SQQ-89 Improved is a ——— active sonar system that is designed to give a ——— for the Block III variant and the same probability of detection in the ——— for the Block II variant. These two systems take advantage of high gain, ——— technology for the receive subsystems. Because these systems exploit a ——— they are not so affected by threat quieting nor ———.

RDT&E FUNDING AND SCHUEDLE DATA

[In millions of dollars]

Program Title	Fiscal years			IOC
	1989	1990	1991	
AN/SQS–53C Sonar	2.9	0.0	0.0	[Deleted]
AN/SQS–89(I) ASW Combat System	40.9	72.1	117.8	Block I [Deleted] (FFG 7), (DD 963), (BGE) Block II [Deleted] Block III [Deleted]

The Airborne Low Frequency Sonar (ALFS) system represents a signficant improvement over current air-borne sonar systems. It is relatively low frequency ——— and is designed to be carried by the SH–60 airframe currently in the fleet. As all surface combatants will be capable of embarking—or at least supporting—this aircraft, this will add considerable flexibility to inter-zone active detection.

RDT&E FUNDING AND SCHEDULE DATA

[In millions of dollars]

Program title	Fiscal years			
	1989	1990	1991	IOC
ALFS	0.0	8.1	9.6	[Deleted]

All of these systems are to be used in support of battle group operations and in the protection of shipping role. In the case of response to hand over from some form of alertment, these systems will be effective in the reacquisition process.

Question. In your view, could more funding than is reflected in the FY90 budget be effectively spent in this area and if so, in what specific activities?

Answer. If an additional $20 million, $50 million, or $90 million were made available to the Navy for ASW Research and Development, the Navy would invest these funds as follows: (Assumption: similar amounts would be available in FY 91).

ASW TECH BASE INCREMENT

[In fiscal years]

Program (Program Element)	Funding level 1—1990/1991	Funding level 2—1990/1991	Funding level 3—1990/1991
Direct Measurement	13/11	15/14	18/16
(PE 0603747N) program			
Advanced non-acoustic ASW	7/11	7/11	15/20
(PE 0603528N—50%)			
(PE 0602314N—50%)			
High gain initiative		10/18	10/18
(PE 0602314N)			
ASW oceanography (PE 0603785N)	8/13	15/30	
Deleted		10/14	14/16
(PE 0603747N—55%)			
(PE 0602314N—45%)			
Advanced torpedo technology			10/12
(PE 0602314N)			

ASW TECH BASE INCREMENT—Continued

[In fiscal years]

Program (Program Element)	Funding level 1—1990/1991	Funding level 2—1990/1991	Funding level 3—1990/1991
ASW C ³ I (PE 0603747N)			8/10
Totals	20/22	50/70	90/122

Each of the programs listed is described below:

a. Direct Measurement Program.—The Navy's requirement to ———.

b. Advanced Non-Acoustic ASW.—Funds would be applied toward accomplishment of all of the following objectives:

(1) ——— would continue to be explored under the leadership of a Navy program. Experimental, theoretical, and analytical efforts would be brought to bear in coordination with DARPA to examine issues determined to remain outstanding upon completion of the present phase of investigation under ———.

(2) ———.

(3) Conduct advanced technology development of active and passive ——— detectors for tactical (helo-based) applications. Experiments, with appropriate oceanographic truth, would be conducted which would establish the expected effectiveness of ——— detection under the range of expected environmental conditions which would be encountered during ASW operations. Real-time signal processing ——— would also be developed. In addition, supporting exploratory development and research would be carried out focusing on explaining and exploiting ———.

(4) Exploratory and advanced technology development of in-ocean ——— would be pursued. Both ——— concepts will be developed and evaluated in realistic at-sea experiments. Basic research and exploratory development would be conducted aimed at establishing a comprehensive understanding of and predictive capability for ———. This would take into account the ———.

c. High Gain Initiative.—This program will be brought to a technology-limited pace leading to early development of a full scale ———. Recent theoretical and experimental work indicates that ———.

d. ASW Oceanography.—Funds will be applied to accomplish the following:

(1) Large Area Remote sensing of the Ocean Acoustic Environment—Mesoscale features, such as fronts and eddies, have been shown to have a significant impact on ASW system performance. At present ———.

e. Advanced Torpedo Technology.—Funds identified will continue in the outyears the Congressionally mandated program to enhance technology development for advanced torpedoes (. . . FY 1989 funding for PE 62314 was increased by $10 million). The thrust of the

program is to expand the scope and accelerate the ASW Weapon Technology Base. The program foscus is on and beyond the ———.

f. ASW C³I.—The ASW C³I system must provide information management and communications capabilities adequate to meet the threat as it evolves into the 21st Century. This means that ASW C³I must not only evolve ——— capability must be established to integrate all source intelligence on the threat, environmental oceanographic data, and own force data. It will require reliable, robust and survivable communications links between ———. The C³I to support the ASW Strategy must be an integral element in the entire process.

Future ASW capabilities will embody the following features:

(1) ——— to collect real time sensor data over a wide ocean area. Alternatively, these fields could be associated with a system of ——— which would periodically visit ———.

(2) Central shore-based ASW contact data assimilation, interpretation, and fusion to produce a tailored, high accuracy targeting product for platforms or long-range weapons.

(3) ——— from friendly platforms or remote sensors.

(4) Specific provision for two-way ——— using some combination of systems such as ———.

As the ASW architecture matures, technology opportunities relevant to the foregoing will be taken advantage of in providing the necessary C³I capability.

T–45TS AIRCRAFT

Question. The Navy requests $429 million in FY 1990 to continue procurement of T–45 trainer aircraft. However, the T–45 ran into significant development problems during operational testing in late 1988. According to OPTEVFOR, the T–45 will not be ready for limited production until the deficiencies are satisfactorily corrected and verified by additional operational testing. Their report listed 33 such deficiencies.

What is the current schedule to make these corrections and verify them in testing?

Answer. The deficiencies identified in the OPTEVFOR report are in three categories: (1) two major deficiencies to be corrected before Milestone IIIA limited production approval scheduled later this year; aircraft bolter/waveoff performance and excessive pitch change with speedbrake operation, (2) other deficiencies to be corrected prior to the next operational testing period (OT-IIB) in the May/June 1990 timeframe, and (3) lesser deficiencies to be corrected prior to the system operational evaluation (OPEVAL) when all development testing has been completed.

Question. What is the current status of the FY 1989 aircraft procurement contract, and what is the current estimated contract award date for the FY 1990 buy?

Answer. The FY 1989 procurement contract is on hold until agreement is reached on correction of deficiencies, estimated to be in late summer 1989. The contract award date for the FY 1990 buy is scheduled for December 1989, and a firm fixed priced proposal is in NAVAIR for evaluation. However, it is anticipated that program changes will likely delay a December 1989 award date.

Question. When will the fixes be negotiated in contract action, and in which procurement buys will they be in force?

Answer. Negotiations have already begun on the range of fixes necessary to correct the aircraft. The great majority are related to specification compliance and are included in the already negotiated development and pilot production firm-fixed-price contracts. It is expected that all corrections identified to date will form the basis of both the FY 1989 and FY 1990 procurement contracts.

Question. Among other problems, the T-45 engine does not have adequate thrust to meet its mission. The Navy and McDonnell Douglas agreed in 1984 to "de-rate" the engine as a way of "streamlining" the program. Why did we de-rate the engine when the additional thrust was needed?

Answer. The Government is under contract with the prime contractor to provide the T-45A aircraft with the engine as contractor furnished equipment (CFE). The question refers to an aircraft discrepancy of unsatisfactory aircraft bolter and waveoff performance observed during initial development and operational testing in November 1988. Analysis showed two causes: (1) rate of acceleration of the engine and (2) aircraft drag in the approach configuration. An aircraft "approach idle stop" has been demonstrated to quicken engine acceleration time by approximately one-third, and further improvements are expected from fuel control changes to be demonstrated in July. Performance evaluation flights have revealed approximately 10% greater aircraft drag in the approach configuration than was predicted, and increased thrust engines to overcome the drag will be flown in July. The British Aerospace Hawk T-MK 1 trainer (flown in the RAF and from which the T-45A is derived) flies successfully with a MK-151 engine at uninstalled sea level standard day rating of 5200 pounds thrust. When the T-45A specification was drawn up a MK-861 engine, then being offered for foreign service in equatorial countries and producing 5700 pounds thrust, was initially offered. The Navy sought increased engine component life and reduced life cycle costs. Based on the contractor recommendation that aircraft performance and engine life requirements could both be met, the Navy concurred in an intermediate rating of 5450 pounds thrust (250 pounds more than the RAF Hawk).

Question. Is it the current plan to procure T-45 aircraft with the de-rated engine, and if so, explain why?

Answer. No.

Question. When will a fully-qualified up-rated engine be available for operational testing?

Answer. A fully-qualified uprated MK-861 engine (approx. 5,800 pounds) is currently installed in T-45A test aircraft, Y-1. It will be available for operational testing in mid-September, 1989. The purpose of testing the uprated engine is to replicate the "hot day" performance of the MK-871 engine. The Douglas/Rolls Royce decision to install MK-871 engines in production aircraft remains firm.

AV-8B RADAR

Question. Mr. Secretary, the FY 1990 budget includes funds to begin development of a radar for the AV-8B Harrier aircraft. Ac-

cording to press reports, such a radar would enhance the attractiveness of the aircraft for overseas procurement. However, its high priority for U.S. forces is not yet apparent.

Does the Marine Corps have an operational requirement for a radar on the AV-8B, and if so, explain what role it would fill.

Answer. The Marine Corps has an Operational Requirement for an AV-8B radar signed August 1988. The role of this upgraded platform would be to engage and destroy all targets under battlefield conditions of smoke, dust, haze or darkness. This will provide the AV-8B with an expanded night weapons delivery capability, V-22 escort, self contained approach, navigation updates, war at sea and anti-air warfare mission capability.

Question. Would the radar be forward-fit or backfit, or both? For the record, provide the numbers of Harriers in U.S. inventory which are likely to receive such a radar.

Answer. At this time the Program Modification Proposal is for 33 forward-fit systems which would end with the buy in 1991 for a total of 276 aircraft. If the full requirement of 323 for the active forces is procured a total of 88 radar equipped AV-8B aircraft will be provided to the fleet.

ENHANCED MODULAR SIGNAL PROCESSOR

Question. Since 1982, the Navy has been developing its next-generation standard signal processor. This program, known as Enhanced Modular Signal Processor (EMSP), justified its high development cost (over $500 million) on the grounds that it would result in life cycle cost savings over the existing processor and would be procured in high volume due to its multi-platform application. However, now that the first version of EMSP has completed development (the "B" version), and a production line has been built, the Navy has decided to keep buying the old processors and wait for a more complex version of EMSP to come along.

Wouldn't you agree that when waivers are approved to use non-standard equipment (or old standards), it casts doubt on the need for funding to develop new standard equipment?

Answer. Current Navy policy directs the use of standard hardware in Mission Critical Computer Resources because of significant saving in system development and life-cycle support. The Enhanced Modular Signal Processor (EMSP; or UYS-2) is being developed as a follow-on to the current UYS-1, the old (but still current) standard signal processor.

Your question was in reference to a recent SQQ-89 surface ship program decision to use the UYS-1 processor rather than EMSP. In this case, the SQQ-89 does not require the additional processing power of EMSP. The UYS-1 can accommodate the processing requirements of current SQQ-89 sensors. Accordingly, the increased cost of using EMSP was not justified until the "Improved" version of SQQ-89 is developed (first procurement tentatively FY 1995). The SQQ-89I plans to switch to EMSP in that timeframe.

PAPER MANUALS ON ADVANCED NAVY WARSHIPS

Question. The 9,600 ton AEGIS cruiser carries 26 tons (52,000 pounds) of paper manuals which describe how to operate and main-

tain the ship. That equates to 150 pounds of paper per man. And the AEGIS cruiser is the Navy's most electronically advanced ship.

Why is so much paper necessary?

Answer. Paper has been, until quite recently, the only time-proven, practical, and easily manipulated medium for shipboard use. Although the majority of paper aboard is used in documents for maintenance and tactical reference activity, there are other valid uses. Aboard the typical AEGIS cruiser that was recently studied (April 1987), there was found to be 53,173 pounds (26.6 tons) of paper for all uses aboard (not just operating and maintenance manuals). Thirty-three percent of the onboard paper storage was for the Combat Systems Department. The bulk of that amount was in Naval Publications including tactical reference and electronics repair reference documents. However, drawings, charts, general records, logs, messages, blank forms and blank paper were also included. Similarly, the Supply Department spoke for 19% of the total for the management of spare parts, food items, and consumables. Eleven percent of the ship's total was for the Engineering Department with primary uses being reference documents for propulsion, power generation, and auxiliary machinery upkeep, with a similar breakdown of other paper types. Other categories of storage included 17% for Operations Department matters (the majority in tactical reference documents), navigation and administration management took 17%, and general executive and miscellaneous functions took the remaining approximately 3%. All of these functional areas were necessary for the cruiser to perform her mission and perform necessary self-sustaining repair, maintenance, and crew support functions. Obviously, the challenge is to satisfy these functional areas, yet reduce the physical bulk of the paper needed. There are a number of promising technologies being explored to meet this challenge.

Question. What programs does the Navy have to automate more of this material?

Answer. The Navy has a number of initiatives designed to reduce the majority of the need for physical storage of paper aboard ship.

a. Technical Manual Automation.—This system is being designed to manage and use electronic manuals, maintaining paper only where necessary. The objectives are to acquire electronic manuals for all new systems and to convert to electronic manuals where productivity can be improved.

b. Computer-Aided Logistics Support (CALS).—The CALS objectives are to integrate reliability and maintenance into the design process to assure more supportable weapon systems, transition from paper to digital technical and logistic information and to routinely acquire and distribute logistic and technical data in digital form for new weapon systems. For systems entering development after September 1988, specific cost and schedule proposals are required for integration of contractor technical information and processes, authorized government access to contractor data bases and delivery of technical information in digital form.

c. Shipboard Non-Tactical ADP Program (SNAP).—The "Paperless Ship" initiative focuses on the existing SNAP system, and explores state-of-the-art technologies for storing information onboard ships. There are presently four prototype installations using optical

scanners, CD-ROM drives and Write Once, Read Many (WORM) technology. The goal is to incorporate these features into the follow-on SNAP hardware re-solicitation.

In addition, there are a number of other programs. For example, there is a system for the management of non-nuclear ordnance ("Fleet Opical Scanning Ammunition Marking System", or FOSAMS), a logistics data distribution system for supply information (called FEDLOG, "Federal Logistics Data Base"), and a system for compact storage of engineering drawings (called EDMICS, "Engineering Data Management Information and Control System") soon to be prototyped in ashore facilities and then expanded for use aboard ship. The initial contract is expected to be awarded in June 1989.

Question. How many tons of paper manuals is the SSN-21 SEAWOLF submarine estimated to have when it goes to sea?

Answer. A final estimate of the weight of paper to be carried aboard SEAWOLF is not yet available.

Question. What is the Computer-Aided Logistic Support (CALS) concept for the SEAWOLF Class, and how does it improve concepts and practices in the fleet today?

Answer. The SEAWOLF CALS program is actively participating in three initiatives:

a. A project which digitizes administrative paper (non-technical manual) requirements.

b. A project to automate technical manuals, drawings, and maintenance procedures.

c. A project to develop a shipboard automated technical database to support the AN/BSY-2 Combat System.

These initiatives are beginning to affect practices in the fleet and their successful implementation should significantly reduce the amount of paper carried.

SURFACE EFFECT SHIP (SES) FOR THE SEALIFT MISSION

Question. Mr. Secretary, a number of DoD witnesses have remarked this year on the sad state of U.S. sealift capability. Most acknowledge that the U.S. could not meet its NATO commitment to move 10 divisions of equipment to Europe within the first 10 days of war (the "10 in 10" commitment) due to inadequate sealift. Much discussion has been made of new development work in the area of "fast sealift ships". Specifically, what is the Navy doing in R&D to address the sealift problem? What are the advantages and disadvantages of developing a new design Surface Effect Ship (SES) for the sealift mission?

Answer. The principal advantage of developing a surface effect ship (SES) for the sealift mission is the improvement of the CONUS to Europe transit time by 40 percent, assuming a 55 knot speed in sea state 4, as compared to a 35 knot advanced displacement monohull. An ancillary advantage of this development would be the availability of a technology which could be used to design high speed combatants.

The main disadvantages of the SES are the high power (400,000 HP) required for a 20,000 ton ship and the extensive R&D needed to scale up to that size from our current operational 200 ton or the

German's 700 ton design; which has not as yet been tested. This work would involve the design, construction and test of at least one intermediate size prototype before the actual work on the 20,000 ton ship could get underway. Lead ship construction costs for the large SES are estimated to be almost three times as high as for an advanced displacement monohull. Follow ship costs would still be in the range of double the more conventional ship due to more extensive and complex machinery requirements. The SES requires twice the horsepower of the 35 knot advanced displacement monohull to attain a speed of 55 knots.

The Navy has stated that this advanced displacement monohull, which is an improved version of the TAKR (SL-7) now in service, could adequately fill the fast sealift role and be available 5 to 7 years after authorization.

Question. In October 1988, the British firm Thornycroft, Giles, and Company offered an unsolicited proposal to the Navy for development of a monohull fast sealift ship. What is the Navy's assessment of that proposal and why?

Answer. The U.S. Navy has thoroughly reviewed the Thornycroft-Giles Co. (TGC) proposal for a semi-planing hull fast sealift ship and have concluded that this concept does not appear particularly promising in sizes required for fast sealift. In regard to the specific proposal presented, a detailed analysis of the technical shortcomings has been sent to TGC. The principal problems with the point design included a hull structure that was inadequate in longitudinal strength and resistance to slamming loads. The propulsion system installation sizably weakened the structure. The deck scantlings provided inadequate strength to absorb the TGC predicted deck loading. Generically, the need for greatly increased power to achieve the seven knot TGC predicted speed increase requires development of 100,000 HP waterjets; a very high risk scale up from the current 18,000 HP waterjets available. Also the placement of four waterjets across the stern results in a serious flow interference problem at the inlets. The predicted efficiency for the waterjet system also appears unrealistically high and the power transmissions require a 43 percent increase over the gear capacity now used to power a CVN. Finally, the 60,000 HP engine they propose does not exist and would require considerable expenditure to make available.

Accepting even the efficiencies and the development risk estimated by TGC the ship speed of 42 knots requires 400,000 HP. As a result of all of this work the Navy has concluded that the semi-planing hull concept was not one to be developed for the fast sealift logistic ship.

Question. Since the sealift problem involves naval support of land warfare and not naval warfare itself, it is fair to conclude that sealift receives a lower priority for funding since it competes with funding for naval warfare missions such as strike warfare and anti-submarine warfare?

Answer. Yes, it is felt that the monumental challenges of anti-submarine warfare and strike warfare and the critical problem of keeping our sea lanes of communications (SLOC) clear and free when balanced against reducing resources moves the fast sealift

concepts to a lower priority. If the SLOC is not secure, all sealift, whether fast or slow is jeopardized.

[CLERK'S NOTE.—End of questions submitted for the record.]

THURSDAY, MARCH 16, 1989.

RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, AIR FORCE

WITNESSES

HON. JOHN J. WELCH, JR., ASSISTANT SECRETARY OF THE AIR FORCE FOR ACQUISITION

LT. GEN. RONAL W. YATES, PRINCIPAL DEPUTY ASSISTANT SECRETARY FOR ACQUISITION

INTRODUCTION

Mr. MURTHA. The committee will come to order. General Yates, is this your first time before the committee in this position?

General YATES. Yes, sir; it is.

Mr. MURTHA. We will put your biography in the record.

The committee is pleased to welcome Mr. John J. Welch, Jr., who is the Assistant Secretary of the Air Force for Acquisition, and Lt. General Ronald W. Yates who is the Principal Assistant Secretary, to discuss the Air Force's fiscal year 1990 RDT&E request of $14.8 billion. Today's hearing is conducted in closed session due to the classified material to be discussed.

Mr. Secretary, if you will summarize your statement, we will put your detailed statement in the record and then we will ask some questions.

SUMMARY STATEMENT OF MR. WELCH

Mr. WELCH. Mr. Chairman, it is a pleasure to be here this morning.

I think we have submitted a good part of our summaries and other material to the committee, so I think I would say our statement is in the record and since there is a lot to cover today, we will just start with questions.

[The joint statement of Mr. Welch and General Yates follows:]

D E P A R T M E N T O F T H E A I R F O R C E

PRESENTATION TO COMMITTEE ON APPROPRIATIONS

SUBCOMMITTEE ON DEFENSE
HOUSE OF REPRESENTATIVES

SUBJECT: AIR FORCE RESEARCH AND DEVELOPMENT

STATEMENT OF: HONORABLE JOHN J. WELCH, Jr.
ASSISTANT SECRETARY OF THE AIR FORCE (ACQUISITION)

LIEUTENANT GENERAL RONALD W. YATES
PRINCIPAL DEPUTY ASSISTANT SECRETARY (ACQUISITION)

March 1989

NOT FOR PUBLICATION UNTIL RELEASED
BY THE COMMITTEE ON APPROPRIATIONS
UNITED STATES HOUSE OF REPRESENTATIVES

Mr. Chairman and Members of the Committee:

I am pleased to appear before you to review the Air Force's proposed acquisition activities for Fiscal Year 1990 and 1991.

In my testimony today I will focus on the progress and plans for Research and Development within the overall acquisition budget. Please note that the written statement I am providing today is based on the Reagan budget. Our formal Acquisition Statement will be provided to you when the amended budget is complete.

In rapidly changing times the best results often accrue from steadfast progress along a reasoned path, with a responsiveness to opportunity which is tempered by history's lessons and common sense. The United States Air Force Acquisition Program outlined in this report is designed to provide the systems and equipment needed by our Aerospace forces to implement our basic military strategy of deterrence in the most efficient manner possible. This program has been formulated against a background of political and technological change of unprecedented magnitude. While Soviet statements and proposals show remarkable reversals in world view and internal workings, those statements are most remarkable for their difference from past Soviet words and actions. They are not yet remotely similar to what we hear and see every day in modern democracies. In addition, General Secretary Gorbachev, though extraordinarily successful to date, is vulnerable in his own country to the consequences of failure. Therefore, we must base our military planning, and therefore our development and acquisition of new systems, on the current capabilities of the Soviets, not their early proposals or our own tendency toward optimistic evaluation of their intentions.

The Soviets do not represent our only concern in the world. Our close neighbors in Central America, our friends in the Middle and Far East, in Africa and South America face challenges to their security which could result in a call for our assistance. In addition, in some countries of the world there is bitter hostility toward the US, demonstrated by both words and action in the form of terrorism. We must therefore be prepared to support our friends, and protect our vital interests wherever they may be threatened. This demands the flexibility to participate throughout the spectrum of conflict, from low-intensity conflict to strategic nuclear war. That flexibility can not be created in one year or one budget. It requires a solid, continuing balance of readiness, sustainability, and modernization, all applied to a sound underlying force structure.

The Air Force budget which supports the Acquisition Program outlined in this report was painstakingly crafted to keep our aerospace forces on a stable, prudent course for ensuring US security, balancing current readiness and sustainability with future investment. The programs in it were chosen carefully to continue the modernization of existing force structure while using economical production rates and multiyear contracting to replace older systems. The new systems proposed here take advantage of our newest sophisticated technology to incorporate

higher reliability and better supportability at lower cost. In our deliberations we sought a balance among required military capability, program priorities, and budget realities.

The Air Force has kept steadiness and fiscal responsibility in mind as it prepared its budget request. Funding stability will allow us to realize the cost efficiencies and economies we have built into this budget. Given the funding, our success will depend on our ability to get the most from every dollar allocated to us.

We continue to emphasize people as the first asset to develop and support. The Air Force has traditionally led the services in acquisition training. We have long recognized that acquisition demands the dedication of highly talented and trained military members and civilians to a career in this specialized field. Certification of qualifying individuals, now underway, will provide us a pool of the finest acquisition managers in the Department of Defense.

Our remaining priorities for this budget are:

Modernize strategic forces

Maintain a high level of readiness and sustainability

Increase airlift capability

Modernize tactical forces

Incorporate our improved ability to operate in space into every mission area

SCIENCE AND TECHNOLOGY

Strong support of our Science and Technology (S&T) program is vital to maintaining the technological edge of our military forces. We have long based our military strategy on the premise that the technological quality of our equipment will overcome the existing Soviet lead in quantity. However, there is an ongoing decided increase in quality of the Soviet inventory due to an increase in their S&T investment and to undesired technology transfer to the Soviets from the West.

The Air Force S&T effort is an Air Force Executive Program and is funded as a corporate investment. There are three basic categories: basic research (6.1), exploratory development (6.2), and advanced technology development (6.3 ATD). In the Air Force most of the 6.1 efforts are managed by the Air Force Office of Scientific Research and are conducted primarily at universities. The 6.2 efforts are managed by Air Force laboratories and develop technology to the point that feasibility for Air Force applications is demonstrated. The 6.3 ATD efforts further develop technology with more integrated component demonstrations of military utility. Assisting in these efforts are cooperative S&T agreements/joint programs with the Army, Navy, DARPA, and NASA which maximize our return on investment and prevent duplication

of effort. After the ATD stage the technology has been matured and it transitions from the laboratories to application in system development.

S&T thus provides the technologies for our future military capabilities. While it often takes 10-20 years for an idea to transition to an operational capability, we are in a technologically superior position today because of the laboratory programs of the past. Our programs are based on both user requirements pull and technology push. We are in close touch with the user community not only to meet their near-term requirements but also to anticipate future operational needs. We capitalize on emerging technologies for new warfighting capabilities.

To do this effectively we must continually develop a broad and balanced set of technologies. There is a core program to support the entire Air Force mission area. To carry out this core program we have several laboratories and program elements. These laboratories meet this diverse challenge by developing both evolutionary and revolutionary technologies. Evolutionary efforts are undertaken to improve our current warfighting capabilities. They include technologies such as turbine engines, simulators, combat logistics and conventional armament. Revolutionary efforts look into the future using the latest in science to make quantum advances in weapon system performance. They include such technologies as those supporting the National Aero-Space Plane (NASP) technology program, high energy lasers, and high power microwaves.

STRATEGIC MODERNIZATION

The strategic modernization program, our number one priority, will ensure that our forces and associated command, control and communications are ready, sustainable, and survivable to meet their peacetime and wartime missions. The Air Force responsibilities in this program are:

Improvement of capability including accuracy, and reduction of vulnerability of land-based missiles

Modernization of the strategic bomber force and their weapons

Improve our command, control, and communication system

To meet these responsibilities, the budget continues the procurement and deployment of the Peacekeeper missile and development of the Rail Garrison basing mode for Peacekeeper. Bomber modernization, through deployment of the B-1B, assures our most versatile leg of the strategic Triad retains credibility while the B-2 Advanced Technology Bomber development and production program prepares to fill the long-term requirement. Continued modernization of B-52s and their transition to a standoff cruise missile role coupled with the deployment of the B-1B and B-2 maximizes the capability of these systems in today's environment. To accompany our bombers, we continue to pursue updated weapons, including the Short Range Attack Missile II (SRAM II), the Advanced Cruise Missile, and the HAVE NAP medium range precision guided standoff conventional missile.

Strategic defensive forces enhance deterrence by providing integrated tactical warning and attack assessment capabilities to detect, identify, and characterize attacks against North America. We are continuing modernization of our ballistic missile and atmospheric warning systems.

The modernization of strategic command, control and communications will be pursued through programs such as the Milstar system, the Ground Wave Emergency Network, and the Defense Satellite Communications System, among others.

READINESS AND SUSTAINABILITY

Ensuring our weapon systems can fulfill their mission requires appropriate numbers of trained operations and support personnel; sufficient levels of training and war reserve munitions; and adequate stocks of peacetime and wartime spares, repair parts, and equipment. In the current constrained fiscal environment, our best efforts are directed at optimizing readiness through improved training and balanced logistics support. For training, our most significant initiative continues with the development of tle dual track pilot training system. For spares and repair parts, we are starting to lose ground as reductions in the spares account begin to affect 1990 and 1991 readiness.

FORCE PROJECTION

The objective of force projection is to get a sufficient quantity of personnel and equipment to the right place at the right time. Resolution of our long-standing shortfall in airlift capability will be accomplished through the upgrade or modification of current systems and through the development and/or procurement of new systems. The KC-10 Extender program enhances strategic mobility cargo capability while improving our refueling support for Navy and NATO fighters. Acquisition of the C-27A will provide a small, rugged, short takeoff and landing aircraft for theater airlift. The C-17 will provide additional theater airlift capability plus allow us to approach the fiscally-constrained goal of 66 million ton miles per day.

TACTICAL AIR MODERNIZATION

We must remain capable of countering any conventional threat in a decisive, timely manner. Modernization of our tactical forces is being pursued through a number of programs. To protect our combat readiness and sustainability while modernizing the force, we will draw down to 35 Tactical Fighter Wing Equivalents from 37. For this force we will continue procuring the F-15E and F-16s, while developing the Advance Tactical Fighter and, with the Navy, the Advanced Tactical Aircraft. To maximize the capabilities of the force, the Low Altitude Navigation and Targeting Infared System for Night (LANTIRN) is being deployed, the improved performance fighter engines will be evaluated, and a variety of new munitions will be developed and procured. These new munitions will arm our forces with several new and improved capabilities in air-to-air and air-to-surface roles.

Modernization of our E-3 Airborne Warning and Control System will continue its support of our tactical forces. Equally important, though, wilI be maintaining the E-3 as a flag ship of the nation. We must ensure it is survivable, and capable of meeting the changing threat both as a strategic and a tactical resource.

SPACE OPERATIONS

US forces increasingly rely on space-based systems for performance of peacetime and contingency operations. Improvements in space operations, a goal for some time, are now showing some results. Continued emphasis on these improvements wiIl allow us to fulIy integrate space-based capabilities into all elements of our forces.

Our launch recovery effort has produced results by returning the shuttle to space and successfully launching all types of our expendable launch vehicles. Continued refurbishment of Titan IIs, and development and procurement of the Titan IV, Atlas II, and Delta II will assure a robust launch capability to lift into orbit our high priority payloads. Space-based support to our forces will be enhanced through the acquisition and launch of our global Positioning System navigation satellites and the development and acquisition of the next block Defense Meteorological Satellites.

The activities I've presented here today represent a carefulIy baIanced program. Our Research and Development activities are vital to the technological quality of our future weapon systems. We are committed to support these activities, and equally committed to constant improvement of our acquisition management process.

Thank you, Mr. Chairman, for the opportunity to make this statement. We will be happy to answer your questions.

Biography

United States Air Force

Secretary of the Air Force, Office of Public Affairs, Washington, D.C. 20330-1000

JOHN J. WELCH JR.

John J. Welch Jr. is the assistant secretary of the Air Force for acquisition. He is responsible for Air Force research, development and acquisition activities, and is the Air Force acquisition executive. He is also chairman of the F-16 Multinational Fighter Program Steering Committee and is the senior United States delegate to the North Atlantic Treaty Organization advisory group for aerospace research and development.

Mr. Welch was born Aug. 23, 1930, in Cambridge, Mass. He graduated from the Massachusetts Institute of Technology in June 1951 with a bachelor of science degree in engineering. He then joined the Chance Vought Corp., Dallas, as a junior engineer on aircraft and missile systems. Mr. Welch held a variety of engineering and program management positions in flight test, missile operations, anti-submarine warfare, advanced programs, and aircraft and missile product development. In March 1965 he became a Ling-Temco-Vought vice president and directed all space defense systems programs. He later became the vice president and manager of all programs and functional organizations at the Missiles and Space Division.

In August 1969 Mr. Welch became the chief scientist for the Air Force and received the Exceptional Civilian Service Award. Upon his return to Ling-Temco-Vought in September 1970, he became vice president of programs for Ling-Temco-Vought Aerospace. In 1974 he became a corporate vice president. He was promoted to senior vice president in 1975 and was responsible for all corporate business development efforts. He assumed his present duties in October 1987 after having been appointed by President Reagan and confirmed by the Senate.

Mr. Welch has held a variety of consultant positions with the Defense Science Board, Army Science Board, National Academy of Sciences Naval Studies, Air Force Scientific Advisory Board, and Air Force Systems Command division advisory groups. He has been a member of the Defense Systems Management College Board of Visitors; MIT Educational Council; and the Center for Strategic and International Studies Committees on Technology Transfer and Defense Futures. Mr. Welch is a registered professional engineer in Texas. He also belongs to several professional, scientific and civic organizations, including the American Astronautical Society, American Society of Mechanical Engineers and the Air Force Association.

Mr. Welch and his wife, Patti, have a son and three daughters.

(Current as of December 1987)

Biography

United States Air Force

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LIEUTENANT GENERAL RONALD W. YATES

Lieutenant General Ronald W. Yates is principal deputy, Office of the Assistant Secretary of the Air Force for Acquisition, Washington, D.C.

General Yates was born Oct. 3, 1938, in Memphis, Tenn., and graduated from Hillsboro High School, Nashville, Tenn., in 1956. He earned a bachelor of science degree in military science from the U.S. Air Force Academy in 1960 and a master of science degree in systems management from the University of Southern California in 1970. The general completed Squadron Officer School in 1964, Air Command and Staff College in 1971, Defense Systems Management College in 1973 and the Industrial College of the Armed Forces in 1977.

Upon graduation from the academy in June 1960, he was commissioned as a second lieutenant. The general received his wings in September 1961 after completing primary pilot training at Spence Air Base, Ga., and basic pilot training at Webb Air Force Base, Texas. He then completed F-102 combat crew training at Perrin Air Force Base, Texas, and was assigned to the 68th Fighter-Interceptor Squadron, Itazuke Air Base, Japan. In June 1964 he transferred to the 509th Fighter-Interceptor Squadron, Clark Air Base, Philippines. During this tour of duty, he flew 100 combat missions in F-102s in Southeast Asia.

The general returned to the United States in June 1966. He was assigned to the Aerospace Research Pilot School, Edwards Air Force Base, Calif., as a student, and remained there as a test pilot and chief of the Aerospace Research Pilot Branch until December 1970. During this period he flew a wide variety of fighter aircraft modified for test purposes. As project pilot in the NF-104 rocket-powered research plane, he made numerous flights to altitudes exceeding 100,000 feet.

From January 1971 to January 1973 General Yates was assigned to Headquarters Air Force Systems Command, Andrews Air Force Base, Md., as director of senior officer management. He then was selected to attend the Defense Systems Management College. Upon graduation in May 1973, he was assigned as director of development test, A-10 System Program Office, Aeronautical Systems Division (ASD), Wright-Patterson Air Force Base, Ohio. The general graduated from the Industrial College of the Armed Forces in June 1977. He then was assigned as the F-16 program element manager, Office of the Deputy Chief of Staff for Research and Development, Headquarters U.S. Air Force, Washington, D.C.

In March 1979 General Yates returned to ASD, where he served successively as deputy F-15 system program director and F-15 program director. He became commander of the 4950th Test Wing, also at Wright-Patterson, in July 1981. He was appointed as the ASD director for tactical systems in April 1983 and system program director for the F-16 multi-national fighter in August 1983. The F-16 program was the largest aircraft acquisition program in the history of the Department of Defense. Under General Yates' leadership, the F-16 System Program Office was awarded the Secretary of Defense Superior Management Award for 1984. He also received the Air Force Association's Distinguished Award for Management for 1986. From July 1986 to February 1989 he was director, tactical programs, Office of the Assistant Secretary of the Air Force for Acquisition. The general assumed his present duties in March 1989.

(Current as of June 1989)

General Yates is a command pilot with more than 3,500 flying hours. His military decorations and awards include the Distinguished Service Medal, Legion of Merit with oak leaf cluster, Distinguished Flying Cross, Meritorious Service Medal with two oak leaf clusters, Air Medal with three oak leaf clusters, and Air Force Commendation Medal with oak leaf cluster.

He was promoted to lieutenant general March 1, 1989, with same date of rank.

General Yates is married to the former Constance Siegrist of Nashville. They have three children: Wade, Dawn and Kristen.

Mr. MURTHA. We appreciate that.

This committee has probably been the foremost supporter of the B–2 in the Defense system. I don't think anybody has been more concerned about it. As a matter of fact, I remember telling former Secretary of Defense Weinberger that I didn't see how we could build both the B–1 and B–2 aircraft. I felt like it was going to be very difficult to build the B–1 and the B–2, and we worked out a deal, you remember, that you kept the B–1 at $20.5 billion, and then we wouldn't slip the B–2 for any reasons other than problems. I mean, it was going to be fully funded the whole way across-the-board.

I even offered an amendment to jump over the B–1 because I felt like it would be obsolete, but we lost the amendment. I supported it after we lost, but I felt we would run into money problems.

We just got a letter saying that you are going to have to slip this first flight.

Tell us what is going on here.

Mr. WELCH. The B–2 has been talked about as certainly a high-technology bomber.

In fact, what is happening right now, we had a rollout last November. We have gone into a very deliberate task of completing the check list before first flight.

We have really run into what are a series of challenges that are taking more time than we had anticipated, but we are not seeing anything unusual. It is not a high-technology thing that is creating difficulties. For instance, the last item we had a problem with was a fitting on the end of an environmental control system. That could happen on any kind of an aircraft. It is our anticipation that we will fly as I said in that letter in the late spring or early summer. We have a fairly complex airplane. It certainly has to be considered a complex airplane and, therefore, access and other things are a process of working out. No show-stoppers.

We are still confident. I am predicting a flight towards the end of May or the June time period. But again, I have to say that when we get into particular schedules, we really get beyond kind of where we are talking here.

Mr. MURTHA. Explain what you do in the first flight.

Mr. WELCH. The first flight, the real key to the first flight is making sure that we have demonstrated the airworthiness characteristics in terms of just takeoff, landing, stable flight and ferry from Palmdale to Edwards, which will be the base from which we will operate, check out the instrumentation systems. So it is a first confidence level flight. There is a detailed card and we would be happy to supply it to you.

[The information follows:]

The current plan for the first flight of the B–2 calls for takeoff from Air Force Plant 42, Palmdale, California, with one Northrop and one Air Force pilot onboard. As is typical on first flights of new aircraft, the landing gear will remain down for the entire flight. The landing is scheduled for Edwards AFB, California, approximately two hours and twenty minutes after takeoff.

Although the test points will not be finalized until two weeks prior to the actual flight, the following is an overview of the current test card: Medium weight takeoff with ——— of fuel; climb to 10,000 ft ——— knots; instrumentation/trailing cone

checkout; functional checks: fuel, air refueling, environmental control, propulsion hydraulic, electrical, and avionics systems; integrated test block—envelope expansion 10,000 feet ——— knots; speed brake operation—15 to 70 degrees; trailing cone checkout; integrated test block—envelope expansion 10,000 feet ——— knots; simulated approaches from 6,800 to 3,800 feet; and landing with speed brake at 45 degrees.

An Integrated Test Block consists of the following: Trim point; air data check/calibration; roll/pitch/yaw doublets; steady heading sideslips; bank-to-bank rolls; turns; and throttle transient (selected points only).

Mr. WELCH. General Yates may want to comment.

General YATES. I agree that on any first flight the real objective is to get up and down safely.

I think particularly in this airplane, given its fairly radical design, we really want to get a good-look at the flight controls. So there is a wealth of information that comes from getting airborne and flying for 20 or 30 minutes.

Mr. MURTHA. I know we can't talk about past funding because it is in the special access field, but everybody wants to use this as a pool of money. You know this is where everybody thinks the money is because it is such a big amount in terms of outlays.

Where are we with this program as far as the amount of money goes? Is the Air Force requesting funds that will move the program forward at a reasonable purchase level?

Mr. WELCH. As you know, we are in the process now of going through a budget to meet the top line that President Bush had set. There are several programs that are large budget items, and those budget items are the ones that get more scrutiny. We will have a hearing to go into details on this on the 12th, I believe, of April, and we would hope that we would have a budget at that time.

I would say that the principles that we are trying to structure the program to are exactly the same. The first flight—it sounds facetious, but true—flies when it is ready to fly. Last year we restructured the program to make sure that we drive to base milestones and that we were not driving to a calendar base. ———.

Mr. MURTHA. You know this committee has been funding procurement ———. We are going to have a tough time with money this year. This is going to be a very, very difficult year. We would like a very careful appraisal when you come before the committee on the 12th with an accurate funding level with this thing. ———. There are so many programs that needs funds and we want to make sure that we have the facts on this thing.

I know you have run into some technical problems in the past, but I assume by the time you get to the first flight, we should know better where we are with this program.

Mr. WELCH. Certainly, flight test is a confidence builder. We don't really do our design or manufacturing in the air. But I think that we have tried to show over the last year in the revised total program we put together that we had put a reasonable reserve in there. I can say that there are no fundamental design problems that we know of at this time. ———. But to make the best investment is in the front end and in the RDT&E part to make sure that we are, in fact, doing it right and not carrying things to a calendar-based schedule. We are on an accomplishment-based schedule.

Mr. MURTHA. Well, we are talking about big money in this program, and we want you to pin it down the best you can and give us

the bottom line when you come here on the 12th so we will be able to make our decision without having any leeway. ———.

FUNDING STABILITY

Mr. Secretary, would you talk about the stability in the program.

For instance, this request has not been made yet, but I understand you are going to ask for $100 million for U.N. peacekeeping forces, and it is going to come out of all the Defense Department budget. They haven't asked for it officially, but we get these kinds of requests periodically. You, I am sure, get your share of these kinds of requests. The Air Force says how much money it has that can be given up for these things which they consider a higher priority.

Have we gotten to the point where your money is scrubbed out? How stable is your R&D program?

Mr. WELCH. I think each year we have tried to build stability into our programs. We do not keep a reserve or anything else at the Air Force headquarters, obviously. So when we have an unanticipated call, we must go back and look at the programs.

They fall into two categories. One category is after the budgeting process. We have had some disappointments or failures, so maybe there are some things that can be stopped. The only other source we have is to look at the individual programs and we begin to operate on things like management reserve to do that.

So the answer to your question is that we can find money like that, but as in any other budget situation, it is at increased risk to the program that we have.

Mr. MURTHA. So do you have what you consider a stable program? Has there been an instability or a stability in the program in the past five years?

Mr. WELCH. If you run through the past five years, we went up and down. One would have to call that an instability. Two years ago——

Mr. MURTHA. It is more expensive when you do that?

Mr. WELCH. Turbulence costs money because it makes more heat than light. So anytime you go into a change, even a decrease, it costs money. So we have tried to take each of the programs that we have, and there are about 700-odd identifiable programs, and create baselines for them. And we have a requirement obviously to report to the Congress when we breach our programs.

But we have tried to institute this past year what I call a lower breach. In other words, working with our program people, we say if you take these kinds of money away, because we have had a budget cut or a budget call, then we have breached a baseline on the downside, too. That is the only way we can maintain accountability with our program directors.

So I would have to tell you that the single most important thing is if we can become stable. If these programs are bouncing up and down, we have a difficult time being accountable.

We are not very satisfied because we believe we should be accountable.

F–16 AIRCRAFT

Mr. MURTHA. For instance, if the Air Force asks for 108 F–16s, we know that it is more economical to buy 180. Last year, in order to make sure we got the most economic buy, we put 180 in, we funded 180, and it cost us $2 million less per airplane.

When we are looking at your budget, would we be better off cutting programs after talking to you or better cutting across the board which makes less money available to each of the programs?

Mr. WELCH. I think that you have to take the two in balance, and I think we have tried to use that word. Obviously we get the job done from the people who are making the mission plans. So they are working the force structure top of it. From the acquisition community standpoint, we are trying to tell them program costs in dollars per unit of force structure.

So the first thing is that if we cut aircraft, we need to cut the support, but we need to go all the way across the board. More importantly, when we add we also need to add the support and then the balance of costs.

If you take those horizontal slices, from my standpoint, the Air Force Secretary and Chief appeared before you and went through the litany of the force structure cuts that have been done, we want to hold force structure and procure to it and support it. So I would have to say that any time you take a cut from us, we have to look across the total and look at force structure and support.

I wish I could tell you that those things are independent, but they are not.

Mr. MURTHA. I don't see how we measure your programs in terms of dollars. It is easy with the F–16; you know what the economical buy is.

How do we make a judgment on where we cut your programs if they have to, in fact, be cut this year?

Do you see what I am talking about? We have got a problem here where they want to use the B–2 funding almost as a depository for money, and we want to scrub it down and we want to make that judgment so we will have money—in the past, we have had money that we can find to adjust and fund all these programs, but how do we measure programs in those terms?

Mr. WELCH. I think that on the production programs, you mentioned the F–16, we have a knowledge base and we can tell you where the knee of the curve is on economic quantities. And we can tell you what the slopes of the curves are as you come down to that economic quantity. ———. So all we can share with you is a forecast. We don't have an actual data base. We will share the details of that in our best judgment.

When you say to take money out of a program, obviously one looks at the more expensive unit cost items, you can see the impact more directly and that is why it gets much more attention. I think you will certainly see as the budget comes down we must ramp those things down. There is no other way to get to a top line. We can share with you and we will be happy to on the B–2, the various ramps, the various alternatives. Keep in mind if you ramp that down and move it out, we are equally aware that something has to fulfill that mission.

Mr. MURTHA. We have not ramped it down. It is on the other side of the river where it has been ramped down, not in this committee.

Mr. WELCH. Poor use of my words.

When we look at the ramp to get to whatever the top lines are, we also have to go back to the people who are using these weapons and recognize things that have to stay that are not being replaced on time because the mission that the Air Force has to fulfill has not changed.

We will show you the tradeoffs on that, too.

Mr. MURTHA. Mr. McDade.

CHEYENNE MOUNTAIN

Mr. MCDADE. Thank you, Mr. Chairman.

Welcome, gentlemen. It is always a pleasure to see you in front of the committee.

Let me start with Cheyenne Mountain. We had the Commander in Chief, Space Command here and we tried to get some answers to what was going on in Cheyenne Mountain and he said "ask the Air Force". It was not his responsibility. Who in the Air Force is responsible?

Mr. WELCH. As far as the single manager with respect to what goes into Cheyenne Mountain, it would be the Air Force Space Command at Cheyenne Mountain in Colorado Springs.

Mr. MCDADE. Does he report to the CINC?

Mr. WELCH. As a component would.

He works for the CINC as the Air Force component commander.

Mr. MCDADE. You are telling me there is a program manager in the Space Command who does the day-to-day operation. Is that right?

Mr. WELCH. As far as a single manager for the acquisition for the operator, in other words, that which he needs to fulfill his function as a component under the CINC; the commander Air Force Space Command.

Mr. MCDADE. Are you satisfied with the Air Force's progress in meeting the CINC's operational requirements with these upgrades?

Mr. WELCH. I think I have to answer that in two parts.

One, we are reviewing the CINC's operational reqiurements because this has been an evolutionary development. I think that is the key.

If you look at Cheyenne Mountain and take synoptic slices of it from the sixties, the seventies, and the eighties, the threat has been changing during that time period and it has been evolving.

If the question is are we satisfied that we are responding to the CINC in terms of what he wants, the answer is yes.

If you are asking the question are we satisfied with how well we have gone about doing that from a schedule and a performance standpoint, the answer is no.

Mr. MCDADE. How is the $118 million requested in fiscal year 1990 going to be used?

Mr. WELCH. For the Cheyenne Mountain?

Mr. MCDADE. Yes.

Mr. WELCH. I will get the breakdown here.

General YATES. Sir, the $118 million breaks out as follows: about $35 million for the Command Center Processing and Display System Replacement.

There is $2.5 million for Tactical Warning and Attack Assessment engineering; about $4 million for the Survivable Communitications Integration System; $9.8 million for the Granite Sentry; and $47.8 million for Communication Systems Segment Replacement. There is also $18.4 million for SPADOC IV.

Mr. MCDADE. We talked about two specific programs when we had the CINC here for the hearing: the CSS–R, a $281 million program, which is $80 million over cost, 2 years behind schedule, and has equipment that cannot be plugged into the mountain.

We talked about the SPADOC program, which was a $437 million program, $147 million over cost, 3 years behind schedule, and 5 to 7 years late on installation.

As you can see, it was a pretty sorry area that we tried to look into. What is the matter with those programs? What is going on?

Mr. WELCH. The first thing I would say is each of the programs is complex. You know I don't use that word lightly.

As I said, we have had an evolving threat. I think as we generally look at those, you can probably divide them in half, maybe 50 percent affected things from a technical performance standpoint and 50 percent probably affected things from a financial instability standpoint.

I am not talking necessarily from a per-line item budget standpoint, but we have talked about cost growth and changes to the cost growth. Let me perhaps, if I could, take a moment to talk about the plug problem. You have a system of systems. General Yates just read the individual line items. They all go into and are a part of the Cheyenne Mountain Complex. They are mutually dependent. At the time you buy one of these subsystems, you have to predict ahead of time what its overall configuration of the entire system will be at the time which you want to build the entire installation. We do have a schedule problem as you point out. The schedule problem is not with the plugs per se in the equipment that was bought. The problem is that the configuration of the mountain itself has not progressed to that point.

Those things are ongoing. That is the reason there is a Systems Integration Office that is a part of the Air Force Space Command that tries to manage each of these interfaces and the timing on these things. Trying to do a much, much better job to be able to know exactly what the CINC wants at a given period of time in a block upgrade mode. But it is not like hardware where you can take out a piece of hardware and put in a new piece of hardware.

The Mountain operates continuously. And since it is in continuous operation, the Space Command must take on the job of not only operating it, but installing and checking out the new equipment concurrent. It is a very significant change that is going on, moving from what amounts to a batch processor-type of system into a integrated processor, which is a more modern type of system.

You know, I think that in looking over the three GAO reports as an example, we find that many of those things are quite accurate, but perhaps not timely. The situation with plugs was not a situation where somebody got to Cheyenne Mountain and tried to plug

something into the wall and it didn't fit. That problem has been understood for a period of about four years, since 1985. We have worked both sides of that interface and it is a management problem and a risk problem.

Mr. McDADE. You still have equipment out there that doesn't interface. It is delivered.

Mr. WELCH. It is delivered equipment, but it is not ready to interface yet. It has not been tested adequately yet, and you have——

Mr. McDADE. If you can't use it, what are we buying it for?

Mr WELCH. What I am suggesting, sir, is that you must install it and test it into an operating system while you are continuing to operate and do the mission that the CINC requires.

It is not something that you can take into a different state, check it all out, and come up and have a plug-in module. All of the systems that were read off, such as the CSS, are really a communication set, a local area network, similar to other computer systems. You know, it is a phasing problem. You would like to be able to shut everything down at some point, take all of your equipment, plug it in, test it out, and bring it back up again. The test period spreads over a period of many, many months. Also, the mountain must stay on line with tactical warning and attack assessment. It must communicate with Command Centers. In the meantime, there are systems in there that have had bandaids on them ever since the sixties because of threat changes. We are going from one complete architecture system to another.

Mr. McDADE. You might have sombody out there reinventing the wheel every other day.

We have indications on these late contracts, nobody argues about it. We also have indications that there were contracts sole source, known deficiencies in one case; according to our information, a contact for $119 million had 590 deficiencies in the phase 1 part of the contact. The Air Force went sole source to the same guy for phase 2. How can you justify that kind of procurement practice?

Mr. WELCH. Depending upon the number of checks that might be in the system, if it is measured in tens of thousands, 500 deficiencies are simply something that must be corrected following a test.

Mr. McDADE. At least that I assume.

Mr. WELCH. You have deficiencies. If the requirement is wrong, that is a very difficult deficiency.

If we have a deficiency with respect to timing, such as something were to happen in five minutes and it happens in ten minutes, that is a deficiency that must be corrected. But it doesn't mean the system is not able to function.

Mr. McDADE. Take the 500, how many were correctable deficiencies? We seem to be in the posture of having a large number of acquisitions that are underway with incompatible sizing, and bad wiring standards.

[The information follows:]

The 500 deficiencies you allude to are what we call Service Reports (SRs) written against a new system during IOT&E. (SRs include such easily correctable items as wiring neatness, room neatness, outdated documentation or items as difficult as out of specification performance).

From the beginning of SPADOC IV Block A IOT&E in October 1987 until the DD 250 was signed for the system on April 20, 1988, 573 SRs had been written. When ESD accepted the system, 294 SRs remained, but only 35 were contractual deficien-

cies. These deficiencies were corrected before the system achieved Initial Operational Capability in April 1989.

Although 23 mission performance requirements were not met in Block A when the system was tested under a high load test scenario, the user agreed the demonstrated performance met their near term needs. These requirements will be met in Block B.

Mr. MURTHA. We did not get satisfactory answers from General Piotrowski, and I am sure you are aware of the problems we have at Cheyenne Mountain and we think you should be prepared to answer these kinds of questions. We are going to have a special hearing on Cheyenne Mountain. We want the people to come before this committee that can answer those questions or there is not going to be any money for Cheyenne Mountain. We have had it pushed from one person to another about who is responsible. At some point, we have to have somebody that is responsible for what happened there and can give us answers. We are trying to withhold judgment about whether there has been a mishandling of it, but when you have overruns and delays like we are seeing there, we think somebody must know the answer and we want that person to come over and talk to us.

Mr. WELCH. It would be wrong if I left you with the idea that we don't know who is in charge. General Piotrowski is responsible for the operations and requirements. The Air Force Space Command is the single manager of the project and we use the Air Force Systems Command to execute procurement contracts—very, very clear.

With respect to the questions that you have on Cheyenne Mountain, I would respectfully suggest that perhaps you want to have a separate preparatory session to go to the detail that Mr. McDade is asking, and I am not suggesting that it is not appropriate detail. It is necessary to understand these details. I would suggest a period of probably four to eight hours to get to the level we are talking about, because if you would like to understand, and believe me, I am 100 percent confident we can very quickly give you each deficiency that was tested in that system, the results of it, the timing out of it, with respect to the requirement.

Mr. MCDADE. The cost overruns, the delays, the subsequent award of sole-source contracts in the face of known deficiencies? We need to get a record on this because the committee is concerned. There is a lot of money on the table and according to the information, we are getting word from GAO and others on a lot of problems. We did not get what we considered to be informative answers when we made an effort to talk to the CINC and there are a lot of problems out there.

Mr. WELCH. I don't want to denigrate the material in the GAO report. For example, on the sole-source award follow-on, number one, it was structured as a phased award.

Number two, the deficiencies in the first phase were moved into the second phase so that it could be timed into the mountain. There was no writing off of those deficiencies. There is no changing of that requirement. There is no relieving of that contractor of his responsibilities.

Is it on the same schedule we started out to be? No, sir.

Mr. MCDADE. How much of a slip is it?

Mr. WELCH. The CSS–R, we expect the IOC to slip and the FOC to slip about four years.

Mr. MCDADE. We are going to have you people back at sometime and we do want to get this ironed out so the committee has a strong feeling of confidence. We are not suggesting that what you are doing is not an excellent job, but we want answers so we have a high degree of confidence that all the money going to the mountain to repair it is being handled efficiently, that we have a sharp chain of command so we know what we are doing—that is what we need to get and we need that very strongly.

Mr. WELCH. We need to give you that because it is very important that we be budgeted to finish this job. It is the only way that the CINC can get on with the things he needs to do.

Mr. MCDADE. You cannot expect us to invest taxpayers' dollars in what appears to be a tangled web. We need to find out what is going on.

ADVANCED CRUISE MISSILE

Let's move to another subject of tangled webs, the Advanced Cruise Missile. As you know, the Congress requires six successful flight tests prior to a production decision.

How many have been successfully accomplished so far?

General YATES. We have had three.

Mr. MCDADE. When will the six tests be done?

General YATES. We think probably this summer.

Mr. MCDADE. It is a hard question for you?

General YATES. You are asking me to forecast success. We are supposed to fly the next missile toward the end of this month, first of next month.

Mr. MCDADE. It will take you through the summer you think to do the sixth successful flight test?

General YATES. Yes.

Mr. MCDADE. You don't advocate buying it before it is flown successfully, do you?

General YATES. I do not.

Mr. MCDADE. So that date could slip?

General YATES. It could go either way.

Mr. MCDADE. But the track record is not very good, is it?

General YATES. No, sir. It is poor.

Mr. MCDADE. How many ACMs do you plan to buy?

General YATES. ———.

Mr. MCDADE. How has this changed from last year's budget?

General YATES. That is the same number we had last year.

Mr. MCDADE. Any changes because of the President Bush budget scrub?

General YATES. That budget is still in work.

Mr. MCDADE. You haven't made a decision yet?

General YATES. No, sir.

Mr. MCDADE. We understand that the Air Force proposed to ——— Pentagon budget deliberations, but OSD directed you to ———. What was your thinking when you wanted to ———?

General YATES. I have got to be honest and tell you that——

Mr. MCDADE. General, we want you to be honest.

General YATES. In asking me what goes on in internal deliberations in the Pentagon about what we do in the budget, I don't think you can put much store in that one way or the other. There is a lot of posturing and game playing that goes on. I think you have to look at how it comes out.

Mr. MCDADE. Did it come out suggesting a ——— cut?

General YATES. Are you talking about the current budget?

Mr. MCDADE. No, Air Force internal deliberations before you went to OSD and the budget scrubs.

Mr. WELCH. I was involved in that, I believe my number will be right, that there were somewhere between 12 and 17 various options looked at at one time during our process.

Mr. MCDADE. Were they all based simply on the question of affordability or was there more involved?

General YATES. There was certainly more involved. We would judge our program based upon the probability of it being successful and to date, we have not been able to generate high confidence in the flight tests.

Mr. MCDADE. We have at least two equations in the 17 options. One is affordability but the paramount one is the fact that this has been a troubled procurement and we are concerned about starting procurement during the troubled phase of the program.

General YATES. That is correct. We have not started that procurement, since we have been able to be relieved of a set IOC date.

For the past several years, when there was no longer a dictated IOC date, we have structured the program like all other programs to accomplishment-based decisions and not calendar-based decisions. We were talking about a 5-year kind of budget when we went to OSD. That did not preclude buying additional——

Mr. MCDADE. You are looking at your 5-year POM—Program Objective Memorandum—and trying to figure out what you ought to do with the program. Do you have any idea what your minimum requirement is at this time?

You have a program that is troubled, that is hard to ask you, how many missiles do you need of a missile that doesn't yet work.

General YATES. Come at it from a different angle. That missile was created because it had a certain number of attributes and perhaps again better discussed in detail, I believe we have a hearing at the same time as the B–2. But those attributes continue to exist today if we can be successful. And the leverage from that successful missile is what makes the user continue to want to keep his money on the table. So the need has not diminished.

Those numbers are being modulated by our ability to be successful in our test program.

Mr. MCDADE. Is there also an interlock with the smaller B–52 force and the requirement for ACMs? Does that get into this equation as well?

General YATES. No, sir, it doesn't.

Mr. MCDADE. Is there a thesis that if you get a smaller B–52 force, you might need only ——— rather than——

General YATES. It is not a function of the size of the B–52 force; it is a function of the size of the target set that we want to take on with this class of weapon. You have to have enough to do the job.

Mr. McDADE. Tell us your plans about using the ACM on the B-1.

General YATES. Right now, we don't have funds in the FYDP to use the ACM on the B-1.

Mr. McDADE. You are not going to use it on the B-1?

General YATES. No, sir, not within the projected budget.

Mr. McDADE. Identify the platforms you intend to use it on now.

General YATES. It is the B-52H.

Mr. McDADE. Period?

General YATES. Yes, sir.

Mr. McDADE. Do you anticipate the B-52 force is going to remain its current size ad infinitum?

General YATES. That is a broader issue. If I consider all models of the B-52, I think the answer to that is, no, but I don't believe for ACM that the size of the B-52 force is a factor.

Mr. McDADE. In our classified report last year, we talked about the concurrency in the program as a concern and indicated that we wanted the concurrency in the program eliminated. Does your current acquisition strategy meet that requirement that you eliminate concurrency in this program?

General YATES. No, sir. It is not eliminated in the program.

Mr. McDADE. Tell me how much procurement you are requesting in fiscal year 1990?

General YATES. Fiscal year 1990 procurement dollars are ——— million.

Mr. McDADE. And we still don't know when the last flight is going to occur?

General YATES. No, sir, but we are talking about flights which, as I mentioned earlier, we anticipate finishing in the summer of 1989, so I think that the procurement number of contracting for ——— weapons in 1990 is a reasonable thing to anticipate.

Mr. McDADE. Well, we told you not to be concurrent in the program because of the troubled history of it.

Mr. WELCH. You know, I don't believe that the concurrency of last year and the concurrency of this year are dramatically different.

Mr. McDADE. Why is that?

Mr. WELCH. You have to return to the front of this program and I will try to reconstruct it. When we started out on the program, there was a dictated initial operational capability date so it was an extremely concurrent program. All the things were being done.

And in fact, the early production aspects of the program were laid in before these tests were successful.

Two additional things happened at that point.

Mr. McDADE. Who inserted that IOC date? Whose direction was that?

Mr. WELCH. I would have to check that. I believe that that was probably set in the Presidential budget.

[The information follows:]

An initial Operational Capability of ——— for the Advanced Cruise Missile on B-52H aircraft was directed by the executive branch as part of President Reagan's Strategic Modernization Program during 1985.

Mr. McDADE. So it was a budget submitted and approved by the Air Force and sent to us?

Mr. WELCH. It was IOC dictated to the Air Force.

Mr. McDADE. The Air Force didn't want to have that IOC in there?

Mr. WELCH. The Air Force will always take an improved weapon early if we can.

Mr. McDADE. The problem is we want to work this problem out with you. You are saying you were driven by an IOC date and I try to ask if you support that. Yes, you do, but you really don't. It was in the President's budget. It came from OSD, someplace else.

Mr. WELCH. Today the President is having a strategic review. From that will come decisions.

In the time period—I believe it was about the 1985–86 time period—there was a strategic review and there were decisions on the IOCs for the B–2 and the ACM as it exists as a national security decision. It is not something that was pushed around and we proceeded to execute. And execute it until approximately the November, 1987, time period, at which time the ACM and the B–2 were put on accomplishment-based schedule, not a calendar-based schedule.

Since that restructure, we have been doing that. If we don't accomplish what we need in our test program, we do not commit the dollars to go on. In fact, we are now beginning to capture that even in our accounting philosophy with our contractors. In other words, they know what they must accomplish in order to qualify for the next year's dollars.

Mr. McDADE. As the Chairman has indicated to you, we are going to have a lot of budget problems and here is another troubled program that isn't through the test envelope and that has a tale of woe behind it. Yet we are being asked to, prior to the last test flight, appropriate procurement dollars.

We will be glad to hear from you about it.

Thank you, Mr. Chairman.

Mr. MURTHA. Unless something comes up, you are going to have to convince us that that money should be in there because I doubt you will get procurement on that program with the problems we have. We don't have extra money at all.

Mr. Sabo.

LONG TERM BUDGET PLANS

Mr. SABO. Thank you, Mr. Chairman.

I have some questions on the B–1, but before that, I am just curious what the process is going on in relationship to the budget to what you do and long-term plans.

You know, I serve on the Budget Committee and my sense is we are operating all kinds of illusions there. Even current budget proposals are far removed from reality. How we can get a budget that is close to reality and reaches a $100 billion deficit. My sense is the only way we get there is with significant cuts, more cuts than most people assume around here in both domestic and defense programs, and with very tough budget numbers out for the next several years. But my sense is that the planning process of R&D and pro-

curement sort of keep going as if the wish lists for money are available.

When I am talking about tougher funding, I am talking about signficantly tougher funding than what the Administration had requested.

Mr. WELCH. I would like to assure you that the R&D process and the procurement process is not going on in a very easy way. It is a very, very stressful situation.

I think we talked earlier, as you introduce instabilities or changes in the funding—when I say you, I don't mean this particular committee, I am saying as it is introduced—that rolls all the way through and things are repriced and they are revalued, which is probably the bigger situation.

So I guess General Yates and I could assure you that we feel this every day in some very long days. It is a very current thing. But it is done in what I would consider as a fiscally disciplined process as we can.

From the acquisition community standpoint, we try to lay the best confidence, best schedule that one can bring force structure on line with and then that must be balanced by the people who have the war to fight, which are the CINCs and the major commands. They are moving their money within this market to balance their mission area, but what we try to bring to the table is to tell them what the risk is, what the confidence of being able to get the product for a given sum of money is, and our job is to go off and manage that risk.

Mr. SABO. Are you looking internally at what options we should be looking at here if in fact both our current-year budget and projected out-year budgets are significantly less than what the President projected in his budget?

Mr. WELCH. As you know, there is an amended review based upon what President Bush set in the early part of February. We would hope this review will be finished the early part of April. I don't have a specific date.

Mr. SABO. But, that budget is one that assumes full inflation growth and some real growth in the years ahead. As you look at that option, are you looking also at budgets that are in fact more restrictive as they relate to money and what those options mean?

Mr. WELCH. At the present time we are responding to the 5-year levels, particularly the 2-year levels in our budget considerations, that were set by the President on the 9th.

You always have incursions to that, but the specific budget being addressed is to the top line that was set by President Bush.

B–1 ELECTRONIC WARFARE SYSTEM

Mr. SABO. On the B–1, the Air Force has spent $3 billion on the B–1 electronic warfare system. As I understand it, you now plan to spend about half a billion of those existing funds to fix the B–1B's baseline ALQ–161 electronic warfare system and another half a billion dollars with a new contractor to add a separate radar-warning receiver to the B–1B fleet that was not originally planned.

What is the Air Force current strategy to fix the B–1B electronic warfare problems?

Mr. WELCH. The ALQ–161 was to be fully integrated electronic warfare system. I think the significant disappointment that we had in that is in the area that I will call ———. In other words, we were not able to in an ———.

Now, the one item that will return that ——— is available in the radar-warning receiver, and in fact in existing radar-warning receivers.

So it is our plan to run a test program, assure ourselves of the confidence that that does return the ——— that we were seeking, and we would add that to the ALQ–161 core program, which is the point we have decided to stop any further development activity on the ALQ–161.

So that half a billion dollars—it will be less than that. It is to add the radar-warning receiver, retrofit the aircraft, do the test program and that type of activity.

The other half a billion that is talked about in there is really part of completing the basic program which captures all the capabilities that we have in the ALQ–161 today, the so-called core program.

Mr. SABO. If we spend this billion-dollar investment, what will be the B–1's electronic warfare capabilities? What limitations will still exist?

Mr. WELCH. You have to start with the concept that electronic warfare per se doesn't really kill or defeat a threat, it degrades the threat. So I think what it will do is, it adds to the capability, to the penetrativity as the threat grows over a period of time. So I think we have a good penetrating bomber today. ———. It improves it.

As I think this committee saw some of the studies last year, that is if we are able to add ——— to mission planning, reduce radar cross-section, fly at low altitude, that those all give us better probability to penetrate and I believe we were able to show that the ALQ–161 system with the RWR probably improved that on the order of ——— percent.

Mr. SABO. How will the performance of the final system compare to what the original system was supposed to?

Mr. WELCH. If you measure performance in terms of penetrativity it will be fairly close.

Mr. SABO. As good?

Mr. WELCH. I don't know to judge. One of the difficulties in the electronic warfare world is we ———.

Mr. SABO. Of the ——— in which enemy radars operate, how many will the final ALQ–161 be able to jam?

Mr. WELCH. You have got to take it in series. I don't think there is a simple answer to your question. ———. So we believe that we will come close to achieving it. I could break it down by threat and by band for you for the record.

Mr. SABO. Please do that.

[CLERK'S NOTE.—Classified insert removed.]

Mr. SABO. Of the top 50 Soviet radar threats, how many could be defeated by the final ALQ–161?

Mr. WELCH. I always have trouble with the word "defeated." ———. Then the judgment is, how many of those can you go against at a given time. Let me give you a number that might help. When we started off, we were talking about being able to handle

on the order of ———. We are looking at dense threats now ——— so as you try to drive pulses through a ———. So we are injecting a person with knowledge into a system and picking the areas that he knows. It is hard to explain. Hopefully these things don't all happen at the same instant, yet we must size the system to the top part of the threat. ———.

Mr. SABO. What is the new radar-warning system supposed to do?

Mr. WELCH. It is for ———. It is an open receiver. It tells you what threats are out there and where they are so you can work around them.

But the preferred system is the ALR-56M, essentially the same radar-warning receiver that you would find in the F-16. It displays to the defensive system operator all the threats that he has out there and he can compare against the predicted ones or whether they are new, whether they should be changing their flight plan or using some type of jamming technique. ———.

Mr. SABO. Was that one originally supposed to bring that capability?

Mr. WELCH. Yes, it was.

Mr. SABO. Is the contractor relieved of this requirement right now?

Mr. WELCH. You have to answer that in two parts. The contractor is unable to perform to meet those requirements, so we are capturing a lower scope in his contract called the core part of the program, and we are in negotiations right now for the considerations that are due the government because of inability to perform.

Mr. SABO. Do we get a refund or has he not been fully paid or——

Mr. WELCH. He has had some progress payments withheld. Essentially it will be a reduced contract value, and there is also a correction-of-defects clause that comes in there.

So the simple answer to your question is, we will get a refund if we overpaid cash; we will get a reduced price because of less value.

Mr. SABO. As you indicated, the radar-warning receiver on the B-1B will be on the one that is on the F-16. How many production configuration ALR-56M systems are deployed in the F-16 fleet today?

Mr. WELCH. None. The ALR-56M award was just made after a competition that has been going on for some four years, but the ALR-56M is a derivative, a much simpler derivative of the ALR-56C, which is in the F-15.

But I can assure you that we will have production-type ALR-56Ms flown in the B-1B before any production decision for retrofit.

The only overlap between the total test program and the B-1B and the ALR-56M will be some small amount of long-lead money that we are talking about, but it is a series test program.

Mr. SABO. How will the two systems be integrated?

Mr. WELCH. In the sense of the operator, the defensive system operator has a multifunction display which doesn't come from the ALQ-161 contractor. Signals that are received by the radar-warning receiver will be integrated like that received by the ALQ-161 and displayed in front of the operator.

Mr. SABO. Will they be electronically linked together?

Mr. WELCH. No, sir.

Mr. SABO. Suppose we just stopped all work on the B-1's electronic warfare system, what would be the operational impact and how much money would we save?

Mr. WELCH. The operational impact will be a ———. I don't think you can say you can or cannot do the job. ——— permits them to use their mission planning and other systems to do the job.

Mr. MURTHA. If the gentleman would yield, are you talking about in peacetime or wartime?

Mr. WELCH. In wartime.

Mr. MURTHA. So in peacetime there is no safety problem there?

Mr. WELCH. No.

Mr. SABO. But in wartime you would consider even if we did not provide for this additional electronic warfare, you continue to plan to use it in the same fashion as a penetrating bomber?

Mr. WELCH. I tried to make the point that there is no one attribute that anyone would go out and buy a totally new system for a bomber or otherwise. You have a number of things that go together in your mission planning and the integration. The flight crew's contribution is much improved if they ———. I think it is simply risk. But I will have to tell you I think it would not be a good decision to stop at this point based upon operations, finance, supportability or any other thing.

Mr. SABO. How much do we save if we stop at this point?

Mr. WELCH. I think it would be certainly something less than half a billion dollars.

General YATES. I think the answer to that is, if we stop the contract as of the 1 June, you could save $600 million but part of that contractual work is to make the systems more supportable.

So if we did as you suggest, we would have to have interim contractor support, which would rapidly start eating into the money that we just saved. In our view, that would not be a productive thing to do.

Mr. SABO. How long in your planning do you assume this plane could be used as a penetrating bomber?

Mr. WELCH. With the threat that we see right now during the time period and those projections are only out to ——— we see that we are perfectly confident to go against that threat.

Mr. SABO. ———?

Mr. WELCH. Yes.

Mr. MURTHA. Let me go back to the question that Mr. Sabo asked because this is a key question. You have convinced the staff but you haven't convinced me that we should continue to spend any money to fix this electronic system.

Go into more detail about this, because obviously if we can save half a billion—I am almost to the point where I believe we should let this airplane go as it is. Is it true, first of all, that every airplane is basically different, that these are not the same or identical in the way he put the electronics inside the airplane? Because he made a mistake, are we then paying for his mistakes with the maintenance contract that you have with him, and what do we lose? Can't the Air Force do this work?

Go through the whole scenario because this $500 million, as I see it we save $500 million if we don't do the new work, but this $500 million is a problem for me. Go through the core program for me.

Mr. WELCH. I want to make sure that we recognize that there are two $500 million here. One is captured in the core program and the other in the RWR. We only save $500 million plus the support if we don't do the RWR.

The question was asked if we stopped where we are right now. You know, you really wouldn't finish up with anything. You have to spend that $5- or $600-odd million to get the core program. So if we are square on that, I will talk about the core program. First, we continue to accept proposals from the present ALQ-161 contractor to evaluate, and will keep evaluating his ways that would fix the program to get it up to the full capability that was expected.

Now, the problem that we have is that the ——— and that is the thing I was trying to describe as a funnel. ———. Now, they say there are ways of signal processing and other things that will solve that problem. We think that the technical risk of doing that is just too high, frankly, with the contractor that we have.

So the program judgment is that we cannot with confidence carry the ALQ-161 program beyond the core, and ———. Now, having a good strategic bomber, the B-1, denying it the ——— that is going to present tremendous leverage with respect to its possible penetrability, as well as to crew risk would seem to me to be something that would be looked at very heavily before one would say, no, particularly since we are saying that is a very low risk. Because although we have not produced the ALR-56M, it is under contract, it is finished with all of its testing programs, and we are producing it today for the F-16.

We are already going to procure, say, over a thousand of those for the F-16. So we have good confidence and the F-16 program precedes the B-1 program.

I can simply recommend it as best value, best value supportable, best value performance and best value from crew.

Mr. MURTHA. I don't think we are talking the same language. You have 97 B-1s out there. Is the ALQ-161 identical in all the B-1s?

Mr. WELCH. Within the budget figures that we have presented here, they will be. They are not today.

Mr. MURTHA. Is every one of them different?

Mr. WELCH. No. Two through 19 or something like that, have an earlier configuration and there may be some differences as you find amongst airplanes. But when we went——

Mr. MURTHA. Two through 19, each one of them are different or they are different than all the rest?

Mr. WELCH. One, they are different than the rest, and two, they would have some significant differences amongst themselves, between each one, yes.

Mr. MURTHA. All the rest are identical then?

Mr. WELCH. To a single configuration.

Mr. MURTHA. So there is 80 or around that figure that are identical?

Mr. WELCH. Yes.

Mr. MURTHA. If we eliminate this $500 million, how much of that money is eaten up by contract work?

Mr. WELCH. This $500 million being not the RWR?

Mr. MURTHA. Yes.

Mr. WELCH. There is a series of elements in there that go in. The retrofits are in there. But you have to go back and step through. You capture a common configuration and I have to give you for the record each element.

[The information follows:]

The Air Force has adopted a two phased approach to solving the B-1B defensive avionics problem. The first phase establishes an ALQ-161A "core" program with EATON Corporation. This "core" program provides a common fleet-wide ALQ-161A configuration (aircraft 2 through 18 have an early hardware configuration that requires retrofitting for standardization and logistical supportability), perfects the on-board maintenance diagnostic system (Central Integrated Test System-CITS), fields the tail warning system, and ———. The projected total cost of the "core" ALQ-161A effort is $725 million. This figure includes $96 million for development, $519 million for correction of deficiency retrofit of prime mission equipment (PME), and $110 million for spares retrofit. Of the $725 million total requirement, $199 million will be financed from active B-1B R&D and procurement accounts while $526 million is being sourced from expired/lapsed appropriations. The "core" efforts will be completed within the $20.5 billion statutory cap (Constant FY 1981 dollars) on B-1B baseline efforts.

The second phase of the recovery plan will install in the B-1B a stand-alone radar warning receiver (RWR) to augment the "core" ALQ-161 program described above. ———. The FY 1990 budget submission requests a total of $116 million in FY 1990/91 for the initial integration of the AIr Force common RWR (ALR-56M) onto the B-1B. The total RWR program estimate is $489 million.

Mr. WELCH. At the end all would be to a single configuration called the core. That is a part of that.

Mr. MURTHA. So it is necessary in order to repair the mistakes that the contractor made or the differences he built into it, whoever's fault it is, you are going to have to spend part of that money to do that?

Mr. WELCH. I don't think that I could name for you, Mr. Chairman, a single aircraft program that was ever produced that in the first 100 airplanes didn't have 100 configurations so we are talking degree here and that is the reason we separated 2 through 19.

Mr. MURTHA. So that is not a big deal in your mind?

Mr. WELCH. It would be a big deal if it weren't done because if we don't get up to that common configuration, it is not a supportable system.

Mr. MURTHA. If it is not a supportable system, that is a big deal.

Mr. WELCH. The money we are talking about here is money within the $20.5 billion cap and is not new money when we are talking about fixing the core.

Mr. MURTHA. We are looking for money every place we can get it.

Mr. WELCH. I understand. This has always been planned. No program that I know of does not go through a retrofit to come up to a common configuration particularly in systems as dynamic as electronic combat systems.

Mr. MURTHA. What does it cost us if you don't have a supportable system?

Mr. WELCH. Interim contractor support is costing us about $25 million a year because we do not have a common configuration and the support systems in place.

Mr. MURTHA. Versus $500 million to put the thing——

Mr. WELCH. No, sir. Keep in mind that $500 million brings it all up to a common configuration and captures the ability to operate consistently, reliably and to contract specifications of the core configuration. If you don't spend that money, you will end up where we have not captured a configuration.

Mr. MURTHA. You end up spending $25 million a year?

Mr. WELCH. You would end up spending $25 million a year forever, but you would be impacting operability. You would be tied to a contractor tail forever. You will be tied to a data base that you can't duplicate.

Mr. MURTHA. In terms of money, is it cheaper?

Mr. WELCH. In my opinion, sir, it would be far more expensive.

Mr. MURTHA. To not fix it.

Mr. Miller.

B–1 AIRCRAFT TECHNOLOGY ENHANCEMENTS

Mr. MILLER. Thank you, Mr. Chairman.

Concerning the B–1B, when we speak of the enhancements that would take place, a monopulse radar countermeasure, high resolution infrared targeting sensor, I know we talked about a number of these already. But when the first B–1 prototypes were constructed, we found out within 24 months that a lot of the avionics and the instrumentation was already outdated. Was it outdated because of the technology change that took place? Was it a mistake by the Air Force by not anticipating this? Was it a mistake by the contractor as to why these items had to be changed and updated?

It seems like we are into the same thing again. Where do we stand?

Mr. WELCH. I am not sure on the question.

Going from the B–1A to the B, there was a change in technology and now are we seeing another change in technology?

Mr. MILLER. That is correct. Not necessarily going from the B–1A to the B–1B. When the B–1B was constructed, we had prototypes, but we found that the avionics and much of the instrumentation had to be changed before we went into production.

I have never found out in talking to the Air Force whether it was actually a mistake, an oversight, whether it was the responsibility of the contractor, or whether it was actually just a matter of technology changing so fast that its obsolete by the time we get the plane operational.

Mr. WELCH. When the B–1A finished, there was about $7 billion, I guess, that had been put in and there were four flying aircraft, and I think with respect to confidence, there was a confidence in the flying qualities of the aircraft and with those systems that contributed to its airworthiness, et cetera, and they were judged to be sufficiently complete at that time so that they could award a production contract.

On a system like the ALQ–161, as pointed out, they probably started off designing an electronic combat system that would operate on, say, ——— and we are seeing in the environment today something ———. So in things that change fairly rapidly like the

number of threats that are deployed, I think you will always see that.

Now, if there is a question of whether we were smart enough to know what at some point from ——— plus pulses, we should have changed the architecture of the system, I have to tell you we weren't that smart, but I don't know that that is a blame situation or not.

We thought and had, in fact, duplicated some of the ability to do that in the laboratory, but when we brought it out about a year ago this time and tried to do it in the aircraft, with all the real world aspects of it in, we were disappointed and did not do it. So I don't think as far as the basic aircraft is concerned that there is a disappointment. I think with respect to the ALQ–161 system, there is a definite disappointment. I am not sure how to address your question of blame. Should we have been smart enough to recognize we need to change architectures?

Mr. MILLER. It appears that advancing technology has a great deal to do with it, that technology changes so quickly. By the time we get one system in place, we find we are already behind.

Mr. WELCH. In the world of electronic combat, as an example, I think two things are happening to us at the same time. One is advanced technology, like pulse Doppler radar is another. The second is the quantity of the threat. One has to do with an escalation of the number of pulses you have to handle which determines how many more threat radars are added into the system. So there are several dynamics going on at the same time. But EC, electronic combat, is the most difficult to be definitive with respect to the threat at a given period of time. I frankly think today we are probably seeing a little bit less of a threat than we would have forecast 5 years ago, and that again is quantity, not quality. We are not seeing quite as many systems as soon as we are seeing them, but we are seeing the sophistication.

FSX FIGHTER PLANE

Mr. MILLER. Mr. Secretary and General, as you know, there is a lot of concern about the proposed United States-Japanese joint venture to develop the FSX using the F–16 technology. Critics of the deal say it is a giveaway of American technology that will help the Japanese achieve their goal of launching an aeronautics industry, and they recall how the Japanese have come to dominate a lot of industries which the United States first developed. Proponents argue that the deal will keep Japan from building the plant on its own and that the United States will actually gain in the flow of technology.

Could you give us your personal view of this proposed FSX deal?

General YATES. Mr. Miller, as you know, the President is in the middle of the throes of making a decision in this and he has asked that we not discuss this until he does make that decision. So I would look forward to discussing that with you hopefully within the next few days.

Mr. MURTHA. We appreciate it.

Mr. MILLER. Well, we have an article in the Post today concerning that Bush is pressed to kill the deal, so—I have not had an op-

portunity to go over all of that article, but if that is the case, then it would be better to hold off for 48 hours. That is what we will do.

I have used my time. Thank you.

Thank you, gentlemen.

TACTICAL NUCLEAR WEAPONS

Mr. MURTHA. The Air Force wants the tactical short-range attack missile, and the Army requests funds to develop a nuclear Lance missile program. Why are Follow-on To Lance and SRAM-T both needed?

General YATES. Sir, let me talk about the Air Force's SRAM. Currently, we have no air-to-ground missile to launch off dual capable aircraft in Europe, and we have been talking this morning quite a bit about the threat. What we need to do is, not send the aircraft into these highly defended areas in war because, our survivability notwithstanding, all the efforts we take still isn't that good.

What we have to do today is direct overflight of the target to drop the nuclear weapon on it. We want to stand off outside the defenses and launch in the nuclear weapon. Now, General Galvin has said that the SRAM, the tactical version of the SRAM, is his number-one priority. He has also said that the IOC of the weapon in ——— is an imperative. We are working towards those ends by procuring basically an off-the-shelf missile modified to be carried on tactical airplanes. The objective, of course, is to stand off outside the target area, launch the weapon in. It also is a way of extending the range. General Galvin has asked for a ———. The SRAM-T will do that. If you flew those airplanes that I referred to as dual capable, if you flew them out as far as they would go, you end up covering about ——— percent of the targets that were tasked to cover. With a ——— we cover another ——— percent of the target base, so we can get to ——— percent of the targets.

Mr. MURTHA. But is the Lance not the same?

General YATES. It is shorter range.

Mr. MURTHA. Where does it stand in General Galvin's priorities?

General YATES. I can't give you a straight answer to that, but below TASM.

Mr. MURTHA. Mr. Miller, any more questions?

SATELLITE CONTROL NETWORK

Mr. MILLER. In an August, 1988, report, the General Accounting Office found satellite control network upgrades in Colorado and California were not meeting performance objectives and had significantly overrun cost estimates of about $1 billion.

What is the performance of this system today? Can you tell us that?

Mr. WELCH. The satellite control network is much like the situation we were talking about in Cheyenne Mountain. They had, I think, two things in common. One, a desire to bring the system on very, very early and second, evolution in the requirements baseline. Some element of the satellite control network included what would have been the DOD control center for the space shuttle, the now cancelled shuttle operations and planning complex.

There was a strong push at the front end on schedule, and they have had, in fact, challenges in bringing those systems on line while at the same time continuing to support ongoing operations without any disruption.

I think the required system is pretty well in place and understood but there are still short falls in satisfying requirements that evolved after the system requirements were baselined and I believe we are beginning to see all the pieces of that system become operationally mature. Again much later than we had hoped and with increasing costs beyond what we had anticipated.

Mr. MILLER. In a December 1988, briefing Space Command officials state some critical capabilities are still having problems.

Could you tell us about those capabilities and why they are critical to the operation?

Mr. WELCH. The problem areas are primarily in the number of satellite control operations one control center can do at a time and the confidence level that each one of those operations will be done reliably. We have increased the number of actual satellite control operations conducted on the upgrade system from 45 percent to over 90 percent in the last year. Our confidence level is up with our success rate over 90 percent against a requirement of 95 percent. Eventually, 100 percent of the operations will be performed on the new system.

So I think if I understand the basic question, we are getting there in numbers, but we have a way to go until we support 100 percent of the operating at a 95 percent success rate. Our confidence is measured by the system success rate. When something fails on a satellite, that is when you want to use the command and control system to take corrective action with the satellite. You need the confidence that when you turn the system on and try to communicate with the satellite that you do in fact communicate.

If you aren't able to communicate with the satellite the very first go, then you note that as a deficiency. You might try again a minute later and it works.

Mr. MILLER. And it does?

Mr. WELCH. And it does. Then that is considered successful. The first one would be considered a failure, the second one a success. So there was a list of critical functions like being able to communicate the first time without a failure, et cetera, that we must demonstrate to improve the confidence.

Mr. MILLER. The GAO reports that the Air Force now plans to spend about $1.85 billion to make these systems operational. Their original estimate was about $600 million.

Can you tell us why the big difference?

Mr. WELCH. I think there are two factors there. I think that over a period of time that this system has evolved, the job to be done has changed dramatically, specifically the number of satellite control operations that need to be performed has increased due to the complexity of the spacecraft and the space launch recovery effort.

I think going back again to Mr. McDade's earlier question, I think we would like to submit to you for the record to show how the satellite control upgrades have changed in terms of additional required options and users that have to be supported. All of these require what I would call acquisition of evolving systems. It is

always nice with an airplane or a missile; somebody tells you how much they want to carry, how far it needs to go and that kind of thing. With the software systems and satellite command and control systems, somebody says, "I want command, control and communication with all my satellites," but nobody defined "all." We have done that over a period of time. That is why we have evolutionary systems and that is why CINC Space gives us not only his requirement but the time phase in which he wants it. Otherwise, we can't capture this history, and I must admit we certainly have some things we want to improve in out management system, but I do not believe we are as bad as the record would say.

Mr. MILLER. Thank you, Mr. Chairman.

Mr. MURTHA. Mr. McDade.

TACIT RAINBOW

Mr. MCDADE. Mr. Secretary, let me direct your attention to Tacit Rainbow, which has been a program that has experienced some difficulties.

As I understand it, the budget request is $21 million in this budget for continued development of Tacit Rainbow. There has been a problem once again in testing here. My understanding is that there were four contractor flight tests. Is that accurate?

General YATES. Yes.

Mr. MCDADE. Followed by 25 government tests?

General YATES. To be followed. We have only done four shots.

Mr. MCDADE. As I understand it, you are not through the four contractor tests, are you?

General YATES. Yes, sir, we are.

Mr. MCDADE. Are they all equally——

General YATES. No, two of them were successful, two hit the target. The other two, one was a workmanship problem, which is one of the things that has plagued the program. And the other one was a failure of a component which was a high-reliability component and it goes into the category of a random failure.

Unfortunately, it was very critical. It was in the air data system, and when we launched the missile, it continued to tell the missile it was above 10,000 feet. If you launch it above 10,000 feet, the engine won't try to start. The missile, even though it was below 10,000 feet, was given data that said it was above 10,000 feet.

Mr. MCDADE. I assume the four tests we are talking about are completely successful tests?

General YATES. No, sir. I am saying two of those were successful.

Mr. MCDADE. I mean the requirement for the contractor to do——

General YATES. No, sir.

Mr. MCDADE. You don't require four successful tests?

General YATES. No, sir. That is a hard thing to judge. You know, there are things you learn on a test. Clearly, you can have a test which comes off like a brick and still get engineering data off of it, even though you know it does not go all the way to the target. We have missions where some missiles will fly for three hours and we get a lot of information and then they fail. We have gotten a lot of engineering data off it, it is partially successful.

So we do not prescribe generally to the contractor having to have all successful tests when we set one of these things up. We launched four missiles—we figure that covers us in terms of covering the waterfront and what we want to learn about it in the early part of the test and it has in this case.

So we have had two completely successful flights which flew all the way to the target and both of them hit the target.

Mr. McDade. The last two didn't work?

General Yates. No, sir, the last one was a completely successful test.

Mr. McDade. So you have a high degree of confidence, do you, that it is time to move into government testing?

General Yates. Yes, sir.

Mr. McDade. A question that occurs over here is, why do you start moving into the government testing when you haven't had 100 percent, at least you hit the target?

General Yates. Yes, sir.

Mr. McDade. On the other side of the street.

General Yates. What we are really trying to do is get one test that is completely successful so we learn everything we need to know about all phases of flight, about the missile, about the end game tracking, about the way it separates off the airplane. If you could do that, you really have the information you need to start the government phase of the test.

So, since there are so many variables in trying to get that, you have to overplay that. That is why you pick four. But having four successful flights would be a wasteful criteria.

Mr. McDade. It is a little difficult for us to understand why you do a contract and not put on the contractor the onus of doing the test rather than shift it over to the government side of the ledger, which is what we are talking about here, isn't it?

General Yates. Well, you know, you could do that——

Mr. McDade. Doesn't that foster sound procurement? Isn't it sound to say to the contractor, "I want you to build us a system which you have described as being plagued by poor work records," and unfortunately that is the case as we understand it. Doesn't it make sense to say to him, "You're not going to put the monkey on the government's back to do it; you've got to do it"?

General Yates. You can do that. You can write a contract like that. I would have to tell you it would be very expensive, more expensive than the way we are doing it.

I mean, we are taking some of the risks. Now, what we have to do here is we have to be prudent.

Mr. McDade. It looks like a large share of the risk, if he has to do four and not be 100 percent successful and then he shifts to you. From this side of the table, it looks like the imbalance is there, he does four, shifts the burden into you to do the 25, and it looks like an unequal distribution. You don't think so?

General Yates. I think that what we are after here is the data—excuse me a second.

Mr. McDade. Sure.

General Yates. The deal Mr. Welch reminds me of is that we needed a successful missile flight before we entered the government phase.

Mr. McDADE. Would you repeat that?

General YATES. We needed a successful missile. We needed another successful missile flight before we started government testing.

Mr. WELCH. By virtue of his contract, he had contractual obligations and where we have had difficulty, he has had to conduct additional tests.

Now, the ones that have been set aside for flight—he has ended up rebuilding missiles to get through and get that confidence level up than were called for in there.

Mr. McDADE. It was our understanding that is what we were going to do, you were going to get a successful test out of them, four successful tests.

Mr. WELCH. Again, I think like General Yates, the idea in the test program is, if you had high confidence you were going to have 100 percent successful, you would not use——

Mr. McDADE. We realize it is an R&D program, you are going to have failures.

General YATES. What we are after is a quantity of data. That is what we have to contract for with the contractor for.

So, in fact, we have gotten that quantity of data that we need. It turns out we have two out of four——

Mr. McDADE. What confidence do you have in the government test you want us to fund that is going to be successful? And I don't mean get off the pad, I mean hit the target.

General YATES. Well, in all due respect, I think that is a little unfair. This is a test program. There are things that we are going to learn about this. We are going to shoot some of these missiles in very, very stressful environment—I mean, in a missile test program, you will shoot some missiles, when you go out and pull a trigger, you only have a ten-percent chance of hitting the target. So we are going to have some misses. What I can say to you is, I am very confident that we are ready to enter the government phase of the test program. I don't think that it is——

Mr. McDADE. So what you are telling me, let me be clear, we understand and want you to stress the missile, that is what R&D is for. It may well be when I said hit the target, that was just asking too much of what you are intending to do. But what we want to be clear on is that when you move from one phase, contractor phase, into the other, that you haven't just shifted the burden to the government to pick up for the contractor's inability to deliver a product. It is the balance question.

General YATES. Yes, sir, and that is my answer to you. We are confident that we are ready to go to the next phase.

Mr. McDADE. Let me ask you this.

Mr. WELCH. Excuse me, I think this may be helpful to you here. Each phase of our programs now, regardless of whether they are missile or aircraft has a milestone, we have the Milestone zero, 1, and 2; there is a test and evaluation master plan that tells you the criteria to achieve before you move from each phase.

So in the four flight validation program that we had here, we knew up front and made our decisions with respect to what would be satisfactory before you crossed over. That is what we are trying to say on an accomplishment-based schedule. We are not running

to calendar, and the risk the contractor picks up there is that time stretches out and he has a fixed-price contract. He is eating that financial risk, although it might not be measured in missiles per se.

We, our course, are not getting product——

Mr. McDade. It is a happier world for everybody when it goes smoothly.

Mr. Welch. We would love that.

Mr. McDade. We would, too.

So what you are saying is that as you begin to shift the testing burden, you have confidence that from your point of view the contractor tests have been successful, you have enough to proceed to the next phase of your development or attempted development of the missile?

General Yates. Yes, sir.

Mr. McDade. You agree, Mr. Secretary, don't you?

Mr. Welch. Yes.

Mr. McDade. Would you specify how you intend to use the fiscal year 1990 funds?

General Yates. Yes, sir. The Research and Development funds in 1990 are $21 million. There is a little over $4 million which go into range instrumentation and then there is some analysis that gets ready for the low-rate production decisions that have to be done. There is about $3 million for work on the B–52 rotary, launcher integration. There is development of the software for the mission planning system, an important part of this. That is about $9.6 million.

The testing that we have to do at the Flight Test Center, $2.8 million, and then the support of the tester or test organizations, et cetera, is about $1.3 million.

TACIT RAINBOW SEEKER COMPETITION

Mr. McDade. Let's move to the seeker that is part of the missile which, as we understand it, is about 50 percent of the cost, somewhere in that neighborhood.

Mr. Welch. A large part.

Mr. McDade. A very large part, yes.

The committee directed last year that competition be introduced into the seeker system. Tell us how your acquisition strategy conforms to the direction to introduce competition in the acquisition of the seeker.

General Yates. Sir, if I could take just a moment of your time, I would like to explain what our competition strategy is and then I will come back to the seeker because it is part and parcel of what the strategy is.

We are just winding up a series of weapon trade studies which have been on contract to three different contracting teams. That is tied up with the Army's ground-launched Tacit Rainbow source selection, but that contractor will also be the second source for the air-launched Tacit Rainbow.

So that means in source selection now——

Mr. McDade. The missile?

General Yates. The missile, yes, sir.

Mr. McDade. That is not the seeker?

General YATES. No, sir.

Mr. MCDADE. Go ahead, General.

General YATES. We would anticipate contract award in September of this year and then in 1993 would be the first year we would split the production buy by. Between now and 1993 we would qualify the second source.

As you accurately stated, the seeker is a large cost of this missile. When we qualify the second source, he is going to have to look for a second source for the seeker too. That is directed in the competition. Otherwise, he is not economically competitive. So it will be part of the whole thing.

We are not intending to split out the seeker itself and go for a second source on the government side for a seeker; we are intending to recompete the entire missile and he will have to take a second source for the seeker itself in order to be competitive.

Mr. MCDADE. Can you assure the committee you are not going to end up with two companies making the seeker?

General YATES. I think we have high confidence in that regard. We did specific——

Mr. MCDADE. We have a lot of high confidence in here today.

General YATES. He did specify he would pick a second source. But what our problem has been, we worked this with the staff and I know they are not all together happy with it, we haven't said to him you can go out and build a missile, but you can't pick X contractor for your seeker. We have not said that, but clearly it would not be a competitive move for him to pick the same seeker contractor that is controlling half the costs of the missile.

He just doesn't have anything left to play with.

Mr. MCDADE. That is why we put language in the committee report.

General YATES. Yes, sir; and we feel very confident that what you are seeking and what we are after is going to happen, but we don't think it is fair contracting, rational contracting to go out and ask a second contractor to come up with a competitive product and preclude him from picking a certain contractor.

Mr. MCDADE. Well, the problem is that it is in the interest of the government, isn't it, to have competition?

General YATES. It clearly is, yes, sir.

Mr. MCDADE. If we are not very careful about what happens here, the odds are you can end up with one fellow making the seeker.

General YATES. Sir, I would partially agree with you. One, we have to be very careful, but I don't believe the odds are we will have one.

I think the odds of that happening are very, very low.

ADVANCED TACTICAL FIGHTER (ATF)

Mr. MCDADE. Be aware of our interest.

Would you give us an update on the ATF? It is a huge program and I would like to hear from you, please.

Mr. WELCH. General Yates has been closer. I think he can do better.

General YATES. As far as update is concerned, I think the most important thing about the ATF program is, when we started this program, we had very little data. We had a lot of tradeoffs to make. Where we are now, and this kind of rolls off your tongue, but it is a monumental step, where we are now is we have got the airplane and the engine sized. That is a very big deal.

We have made, I think, most of the tradeoffs that we know of in the airframe and engine world.

So, that yields some general weights.

We know the size of the airplane, we know the general thrust——

Mr. MCDADE. What is the general size? Give us a little information about the size of the engine, will you?

General YATES. I have to tell you, sir, right now that is all competition sensitive information. In general, the airplanes tend to be a little heavier than our goal, but we are able to maintain our advantage over the threat we are anticipating. So we are extremely pleased with that portion of the tradeoff. What remains to be done is between now and the end of the year is make the same critical, important tradeoffs on the avionics side of the house, and that has not yet been done, and that is critical not only to the performance of the airplane, but the costs.

Mr. MCDADE. When do you expect to do that?

General YATES. Those studies are ongoing now. We start getting into the decision process about the September time frame.

Mr. MCDADE. Anything else you want to add?

General YATES. I would be happy to be more specific on anything.

Mr. MCDADE. I just want a general update.

Is that the conclusion?

General YATES. Yes, sir.

Mr. MCDADE. Mr. Secretary, do you want to add anything?

Mr. WELCH. We believe the program is proceeding along well.

As I say, the focus we have now is to make sure we capture the right avionics in there. As you know, a large part of that program is integrated avionics, which I believe, are working very, very well with respect to the Navy version of the ATF. I would have to say for the record the same on the other direction, with respect to the Air Force A-12.

Those programs are going along. I would like to say that——

General YATES. If I could add one more thing just to enforce Mr. Welch's comments on the avionics, clearly a high-risk area.

In the last year, we have made a very extraordinary stride in understanding the technologies we need in order to make the avionics work.

Mr. MCDADE. Thank you.

Mr. MURTHA. Mr. Dicks?

ANTI-SATELLITE (ASAT) PROGRAM

Mr. DICKS. Thank you, Mr. Chairman.

Thank you, General. I am sorry that I missed your testimony. I wanted to ask you a couple of questions.

Your request is $70 million to continue research and development of laser and microwave technologies. These include microwaves and a variety of lasers. Please explain these technologies and their ASAT potential. Tell us, General, where we are on this.

Mr. WELCH. Ground-based lasers are a class and I think we can talk about those.

There are various R&D programs that have been going on in the program, oxygen-iodine lasers, that kind of thing.

And I believe those are coming to the point we can begin ground demonstrations of beam forming and other things. It is planned for 1991 to try to decide on the ground-based laser area, and if you would like for the record, we would be happy to give you a technical description.

Mr. DICKS. That would be fine.

[The information follows:]

Much of the technologies being developed in the Air Force directed energy program are not ASAT related. In fact, only $38 million of the FY 1990 request is for ASAT technologies. The Ground Based Laser (GBL) Technology project is developing high energy laser technologies which are applicable for a GBL ASAT. The current plan is to develop the key candidate technologies so that a decision can be made at a 1991 Milestone I on the development of a GBL ASAT system.

The highest priority ASAT technology efforts are in atmospheric compensation. Since the basic ASAT approach does not have a cooperative target in space for the first leg, there is no easy way to get detailed atmospheric propagation data in the point ahead direction (where the target will be). SDI has a beacon to help them. The problems of pointing and keeping the beam on target are also critical. The device questions are much more optimization/engineering questions. The prime questions are how well does atmospheric compensation work for each concept and what are the performance/cost trades for each concept.

The Air Force is developing several device technologies; the chemical oxygen iodine laser (COIL) device, and the repetitive and single pulse excimer devices. The Army for SDIO is developing the free electron laser (FEL) device. The Air Force is also developing the generic technologies such as atmospheric compensation and specialized optics and is performing the system assessments for all candidates to support the Milestone I.

The COIL technology has made major progress over the last few years. The in-house device, which is based on scalable technology, has achieved 35 kilowatts and excellent beam quality. We are currently investigating various techniques which will allow more efficient scaling. The COIL operates at 1.31 microns which is in the infrared very near visible. This frequency is short enough to reap the higher brightness (more power on target) advantages of short wavelength without the optical fabrication and propagation problems of the shorter wavelength lasers. Because COIL is a chemical laser, much like the longer wavelength MIRACL device, the technology is fairly well in hand.

The repetitive pulsed excimer device technology is represented by the EMRLD device at White Sands, NM. This technology is less mature than the chemical laser device technology and requires large electrical systems to operate. This device has demonstrated 24 joules per pulse (around 5 kilowatts) at very good beam quality. There have been problems with parts of the device which have caused significant delays and overruns. The program will complete the characterization and simple scaling (doubling the power) of the current device this year. The scaling technology is fairly well understood, and there are many other higher priority ASAT questions to be resolved, thus, the program will stop at the end of the year.

The single pulse excimer is even further behind today, but with the currently funded DARPA and Air Force programs, enough of the technology will be in hand to allow single pulse to be judged on equal footing with the other device technologies. The biggest questions are in the validity of the different kill mechanism and the scaling of the single pulse technology.

The biggest questions for a GBL ASAT technology are in compensating for the deleterious effects of the atmosphere on the high power beam. This is the major area of our program. Atmospheric compensation is less critical at longer wavelengths, but shorter wavelengths, in general, provide high power on target for the same output power and telescope size. Thus, the determination of the practicality of

the atmospheric compensation is the key for the Milestone I decision. There has been very great progress in this area, and we are confident that techniques are being developed that will allow GBL ASATs. However, since the degree of benefit depends on the size of the output beam, and because of the complexity of the scaling relationships, actual performance must be measured on a near-full-scale optical system. The Air Force is obtaining a 3.5 meter telescope for atmospheric compensation experiments.

We are also developing the unique optics which are required for a GBL ASAT. The prime area of development is in specialized high power optics such as the aperture sharing element. This mirror allows the pointing and tracking to be done through the high power laser beam train, much like in a single lens reflex camera but without the moving parts.

The system assessment studies are progressing well. We have made great strides in developing satellite models for vulnerability studies. Actual experiments are also a key part of the assessment studies. The system concept studies will be refined efforts based on the work which supported the OSD study for Congress last year.

Mr. DICKS. What is this $70 million for? I would like to know what this program is all about.

General YATES. Well, sir, of the $70 million, $38 million is for ground-based lasers. The way it splits out is there is $8 million in there for atmospheric compensation work. There is $5 million in the chemical oxygen-iodine laser; $4 million for systems and vulnerability assessment; $11 million for the large telescope, which supports the atmospheric compensation experiment and then there is $3 million in there for MIRACL upgrade.

Mr. WELCH. A more broad answer to your question, within the architecture of space control, is obviously there are ———.

Mr. DICKS. This is a Space Command issue; right?

Mr. WELCH. CINCSPACE requirement.

Mr. DICKS. All right. Go ahead.

Mr. WELCH. And there are obviously several ways that one can address it. It can have directed energy, kinetic energy, or direct ascent type of systems. What are being traded off right now between so-called milestone zero decision where the CINC had a need that he put on the table is to look at the ways to solve his problem.

Some are kinetic energy and they are looking at various options.

Mr. DICKS. Who is in charge of this program? Navy, Army, Air Force, Marine Corps?

It is a joint program. Isn't that correct? Who is in charge?

Mr. WELCH. Right now the decision is that the Army will run the Joint Kinetic Energy Program Office from the time period phase zero to concept selection next year.

Mr. DICKS. I hear the Navy had the money in its budget for the program. Where is the money going to come? The Navy isn't going to leave that money in there for this program, as I understand it, in the revised budget if the Army is going to run it. We have a little turf struggle here, don't we, Mr. Secretary?

Mr. WELCH. There are many ways to solve this problem for the CINC.

Mr. DICKS. Is DOD going to insist money be kept in the budget?

Mr. WELCH. I can't answer that question.

The direction was that the Army would have the Joint Program Office, the Navy would be the deputy and would fund that with the fiscal year 1990 funds. The Air Force is in the C3 part of it, not in the kinetic energy systems that are being discussed here as far as kill is concerned. But to answer your question, that is the manage-

ment decision to come to a concept decision. In other words, what system are you going to use? What technology will be involved and who is going to—whether it be land-based or sea-based; and that should——

Mr. DICKS. When are we going to decide this matter? Are we just spending a little money here and looking at options—Admiral Crowe says this is one of his two or three top priorities as Chairman of the Joint Chiefs is to get an anti-satellite capability.

Mr. WELCH. The present schedule would say the decision on the basing of kinetic energy would be by December of this year, and by 1991 time period with respect to directed energy, ground-based activity.

Mr. DICKS. To have a system deployed?

Mr. WELCH. No, sir.

Mr. DICKS. A decision on which way to go?

Mr. WELCH. Which concept to use, who is going to run it and on what schedule.

Mr. DICKS. By 1991——

Mr. WELCH. On the kinetic energy by the end of this calendar year, by 1991, the ground-based laser decisions would be made.

Mr. DICKS. What will your testing schedule look like? Is it still too early for either the ground-based laser or the kinetic energy.

Mr. WELCH. The kinetic energy, we are in concept exploration now.

There really isn't a schedule per se. Once they decide the concept they want to use, whether it is a ship-based or whatever, they will come up with a schedule.

On the laser activity, there are actually a series of test programs that build up out at the White Sands Missile Range and other places that will give actual measured test data for the decision on the directed energy, but I do not know if the test schedule is firm for kinetic energy.

Mr. DICKS. When do you think you will be shooting at objects in space?

Mr. WELCH. All right.

Mr. DICKS. We would like to know that.

There are a series of other questions here that we would like to have asked for the record.

Mr. WELCH. I would have to say for the record unless the law is changed, I believe we will not be shooting at objects in space for some time.

I wanted that on the record.

[CLERK'S NOTE.—Questions submitted for the record and the answers thereto follow:]

Question. The Air Force requests $70 million in fiscal year 1990 to continue research and development of laser and microwave technologies for ASAT weapons. These include high power microwaves and a variety of different lasers.

What is the earliest that any of these systems could pose a threat to operational satellites?

Answer. First let me make clear that the $70 million request is for a variety of directed energy efforts. Only the $38 million for

Ground Based Laser Technology (GBLT) is providing research and development for an ASAT weapon. The MIRACL laser system, which is to be upgraded by the Army in FY 1990, ———. The technologies being developed in the Air Force GBLT program have more payoff than the MIRACL technology due to significantly higher growth potential, but are higher risk. ———. Budget documentation describes a tri-service plan to upgrade the existing MIRACL laser ———.

Question. What is meant by ———?

Answer. The Secretary of Defense has decided not to upgrade MIRACL until FY 1990 and it will be funded by the Army. The MIRACL upgrade will allow ——— while other higher payoff technologies in both directed energy and kinetic energy weapons are developed.

Question. What is meant by ———?

Answer. The MIRACL upgrade will allow the United States to ———.

Question. Provide for the record a detailed schedule for this effort and a breakdown of funding by fiscal year.

Answer. The Air Force has provided $8 million during FY 1989 for research and development and system improvements. No ——— efforts are included. The Army is to begin the upgrades in FY 1990.

Question. Last year, the DOD came close to closing down MIRACL due to its low priority. Isn't it odd that we are now planning a "crash program" to give it ———?

Answer. In 1988, the Secretary of Defense decided that an interim capability was needed to help deter potential Soviet ASAT use. The upgrade will not provide an ———. It will place at risk a few low altitude satellites and will require significant lead time for any shot.

Question. Last year, the Office of the Secretary of Defense reviewed MIRACL's ASAT potential and concluded that it would cost $270 million and was "judged not significantly capable to merit investment."

Answer. ———.

Question. The Committee is advised that the House Armed Services Committee has objected to your plans for MIRACL. What are their objections and how will they be resolved?

Answer. The Chairman of the House Armed Services Subcommittee on Research and Development has stated that he feels that ———.

Question. Please explain how the Air Force plans to proceed with the single-pulse excimer laser project during FY 1990, including an obligation plan and specific activities being funded.

Answer. Due to the fact that the Air Force has only just received the FY 1989 funds, much of these funds will be obligated in FY 1990. The major activity will be the development of a moderate power demonstration of single-pulse excimer laser device technology. Approximately $8 million will be available for the device technology in FY 1990. The exact amount will depend on solicitation responses. Also, approximately $1 million will be obligated in system assessment for single-pulse excimer lasers.

Question. What is the Air Force's plan for continued development of the EMRLD laser and why?

Answer. The EMRLD device effort will be terminated this year at the completion of the characterization and scaling of the master oscillator due to the high cost to both maintain the facility and to continue development of the raman and power amplifier subsystems. The current program is significantly behind schedule and over budget. Thus, we cannot justify keeping the system open for further device engineering development. The key factor for a repetitively pulsed excimer ASAT system is the ability to perform atmospheric compensation for the very short wavelength pulsed beam. We will continue to investigate this aspect. We will also continue to perform system assessment on the EMRLD technology so that the rep-pulsed excimer laser will be a candidate in the ground based laser ASAT Milestone I.

[CLERK'S NOTE.—End of questions submitted for the record.]

DEFENSE SUPPORT PROGRAM (DSP)

Mr. DICKS. Let's talk about DSP follow-on.

Current plans call for the current Defense Support Program satellite, which provides early warning of ICBM and SLBM launches, to be replaced in the 1990s by SDI's Boost Surveillance and Tracking System statellite. Do you think that DSP could be upgraded to a satisfactory performance level to accomplish tactical warning and attack assessment during the nineties and, if so, what are the specific things that need to be done in order to achieve that?

Mr. WELCH. First, let's talk about BSTS. Air Force had a requirement to upgrade TW/AA for some period of time. When SDI came into existence, they added requirements to that capability.

So to answer our question, to the best of the requirements we understand for SDI right now it would not be possible to take the DSP that far.

Mr. DICKS. I am told General Randolph or General Yates said in Los Angeles that BSTS is a clear-cut violation of the ABM Treaty. If that is true, some of us are worried we are not going to have an evolving DSP capability. Space Command is very concerned about this because of the cost of BSTS.

I think it would be ridiculous if we went ahead and started to do something when we know ——— until we see where we are going to come out, what this Administration's policy is going to be on SDI and on START.

Mr. WELCH. General Yates could speak for himself.

Mr. DICKS. General Randolph, I think, said that.

Mr. WELCH. His staff can't trace back that statement.

Mr. DICKS. Is it a ———? It is a space-based—isn't that BSTS? ———.

Mr. WELCH. Well, I think if SDI requirements get into ———.

Mr. DICKS. ———? That is much different than reviewing it, Mr. Secretary.

Mr. WELCH. I said it exactly the way I did because we are trying to get an exact understanding.

Until you define the requirements, until it ———.

Mr. DICKS. If it is a space-based radar, which it clearly is, and it ———? That is what General Randolph apparently said in Los Angeles to a group of aerospace people and it was widely reported.

Mr. WELCH. As I say, I can't—let me assume for a moment that we put up a BSTS that had the identical capability to the DSP today, simply improved its reliability ———.

Mr. DICKS. It is the battle management aspect that violates the agreement and that is what you are building into BSTS I am told.

Mr. WELCH. No, sir. That has not been decided yet. If you hypothesize all the requirements, we do not have a go-ahead specification to procure a BSTS.

You are exactly correct. If you go the ———. You come back on the Air Force side of the house——

Mr. DICKS. You could do that with DSP, if you ——— isn't that correct?

Mr. WELCH. Exactly.

Mr. DICKS. All the guys are nodding, so I feel comfortable with the assessment. What about DSP upgrade? Tell us about that.

Mr. WELCH. A couple of things, last year in the bill, we got direction for about $4 million to look at upgrades and we are proceeding with that.

DSP has evolved over a period of time. Today we do not see that the DSP upgrade meets the Air Force needs, the tactical warning and attack assessment.

We are going to look at that.

Mr. DICKS. For the record, please explain what you think the deficiencies are of DSP upgrade and why you think BSTS is a more satisfactory solution.

Also explain how you would do BSTS without being violative of the ABM agreement.

Mr. WELCH. To answer your question here so you can think of the answer, the threat is changing, so the sensitivities and those things we want to detect is the question with respect to tactical warning attack assessment.

We will give an answer for the record.

[The information follows:]

First I must distinguish between the DSP satellites presently on orbit and two separate system improvements that have been improperly referred to as "DSP Upgrade" in this discussion. Those systems are the current upgrade to DSP called "DSP-I" and a hypothetical upgrade to DSP-I called the "evolved DSP." ———. The DSP-I will represent a significant improvement over the current generation of on-orbit satellites with its first launch planned for ———. A follow-on system is needed.

For a follow-on we considered the evolved DSP-I, a TW/AA-only BSTS and a fully capable BSTS and are convinced BSTS is the correct choice. The evolved DSP-I would satisfy the future TW/AA requirements with medium risk. Further evolving DSP-I to meet SDI requirements is equivalent to a new spacecraft design. BSTS is our new spacecraft design and has been developed based upon an extensive, ongoing, progressive open competition that started in FY 1984. A scaled down BSTS to perform the TW/AA mission can be fielded at approximately the same cost and risk as an evolved DSP-I and offers growth to meet all forecasted requirements. The BSTS program should continue as planned through 1990. At that time a decision will be made on a system (full- or scaled-down) to be placed into full scale development.

This information is documented in the Report to the Congress on Space-Based Infrared Ballistic Missile Detection and Tracking submitted in June 1988 as directed by the FY1988 Conference Authorization Report. The classified annex to the FY1989 Conference Appropriations Report directed $4 million to be used for a follow-on study that is presently underway with the goal of providing detail not included in the original report.

Compliance of BSTS with the ABM treaty is a complex issue. Compliance review is underway but not yet complete. It is being accomplished by the Office of the Secretary of Defense. OSD plans to provide compliance guidance by mid-1989 for compliant options for a mid-1990 FSD decision. The TW/AA-only version of BSTS will be a functionally equivalent replacement for DSP and we anticipate it will be as compliant as today's DSP.

Mr. McDADE. Specifically, is there an Air Force requirement for the DSP follow-on to detect and track boost-phase vehicles and if so, why?

Mr. WELCH. I would have to go back and check it for the record. I can think of a tactical warning and attack assessment value for that, but as far as a requirement, I can't answer.

BOOST SURVEILLANCE AND TRACKING SYSTEM (BSTS)

Mr. McDADE. The current 5-year plan includes $1.4 billion for BSTS development through fiscal year 1994. This will apparently not result in a full SDI capable satellite or result in a full-scale flight development. The flight experiment will only include subscale optics and a partial focal point sensor with the objective of data collection not validation of full-scale engineering performance. Even this schedule presumes SDI funding profiles which are likely to be reduced.

Are you comfortable with the current BSTS program and if not, why not?

Mr. WELCH. I think that is a question better addressed to SDI people since it is an evolving requirement.

Mr. McDADE. All right.

Mr. WELCH. We are executing for the SDIO, not putting their requirements together.

NATIONAL AEROSPACE PLANE (NASP)

Mr. McDADE. I will ask the other questions under my name for the record.

How about the National Aerospace Plane? Where are we on that?

Mr. WELCH. The National Aerospace Plane, as you know, is an X aircraft. We are coming up on a time period where, hopefully by next month, we will be setting the selection criteria for choosing between the engine manufacturers and airframe manufacturers with the hope that in 1990 and with the present budget that is submitted to the Congress, that we could start our flight program.

HEALTH IMPACTS OF AIR FORCE AND DOD EMPLOYEES

Mr. McDADE. Now, last week, two weeks ago on "Sixty Minutes" there was a report raising questions of health impacts of Air Force and other DOD employees regarding EMP testing.

What is the Air Force doing to look into this issue and who is responsible, who could I talk to to better understand that program and the potential health effects to workers?

Mr. WELCH. I would have to get you the name. It is over in our readiness area and we will supply it for the record. I think Mr. Vest.

Mr. McDADE. Gary Vest?

Mr. WELCH. Yes.

Mr. McDADE. What are we doing about it?

Mr. WELCH. I would have to say I am not current on the issue of the lawsuit. I believe as far as that program is concerned, it is still being investigated. As far as the program of material, EMP and other environmental things, we just recently as an example had a large conference of all the people, manufacturers, doctors, and all to look at the effects of new materials and try to compare data, get the data of that material so that it is in the hands of the manufacturers, displayed in the area for employees, and in fact provide access in all our program areas for the OSHA people who have the responsibility.

Mr. McDADE. Including classified areas?

Mr. WELCH. Including all classified programs.

Mr. McDADE. That wasn't the case prior to the Lockheed matter, was it?

Mr. WELCH. I have to check that. I believe with the exception of a short period of time when they were moving from one cleared person to——

Mr. McDADE. Do we have an OSHA person that has been into the B–2 facility at Boeing?

Mr. WELCH. I believe that is right. Yes.

Mr. McDADE. We have an OSHA person now there?

Mr. WELCH. Yes. I don't know that he is necessarily resident, but we have——

Mr. McDADE. Somebody is cleared to go in there, one person for the entire west coast? That is not very satisfactory frankly.

Mr. WELCH. I can't give you an answer, but they generally don't have resident people, but there are people on the premises like, with our AFPRO people and others who need to be sensitive to these areas.

Mr. McDADE. Let's put it in the record. Lay out what you are doing on these sensitive materials, lay it out there and let us know who we talk to. If it is Mr. Vest, we will talk to him about this matter.

[The information follows:]

Prior to May 1989, Boeing responded to the Washington Industrial Safety and Health Act (WISHA), rather than OSHA, for employee safety at their B–2 facilities in Seattle. Under the Integrated Contractor Assessment Program, Boeing's safety procedures, and compliance with those procedures, are monitored by the resident Air Force Plant Representative Office (AFPRO). However, the principal responsibility for employee safety rests with Boeing.

On 18 May, 1989, the Department of Labor and Industries of the State of Washington initiated an occupational safety and health inspection of the Boeing Company facilities in Seattle. At that time, the State of Washington relinquished inspection authority to the Department of Labor OSHA for all Boeing facilities which required special security clearances for access to program specific areas. Two OSHA inspection team individuals were approved for access on 22 May 1989, with program briefing and B–2 facilities inspection completed on 9 June 1989. Results of the inspection have not been published; however, preliminary information suggests that no significant problems exist.

Prior to this time, there were no OSHA or WISHA personnel in Seattle cleared for the B–2 program. Mr. Gary Vest, Deputy Assistant Secretary of the Air Force for Environment, Safety, and Occupational Health, toured each of the major B–2 contractors' facilities and provided testimony to the Senate Subcommittee on Toxic Substances, Environmental Oversight, and Research and Development on March 6, 1989, regarding his visit.

Mr. MURTHA. Thank you, gentlemen. Mr. AuCoin and Mr. Livingston have questions for the record.

The committee will adjourn until 1:30 p.m. this afternoon.

[CLERK'S NOTE.—Questions submitted by Mr. AuCoin and the answers thereto follow:]

VANDENBERG SATELLITE LAUNCH COMPLEX

Question. I am interested in the progress made so far regarding the Vandenberg Satellite Launch Complex No. 4. Would you please tell me how the Air Force feels about the current construction, its quality, its timing and general overall impression of the work currently being done by the contractors?

Answer. After some initial problems regarding the availability of the steel and the quality of the bolts in the structure, the overall construction is proceeding well. The Umbilical Tower is complete. The initial Mobile Service Tower (MST) modules have arrivied at Vandenberg AFB (VAFB). The initial inspection of these modules shows excellent workmanship. The jacking tower is being erected which will allow for the installation of the modules. The schedule is behind what we originally planned but since the initial delays, it has changed very little. The overall impression is good. The task being accomplished is not routine and each previously unknown situation encountered is being handled in a professional manner. These unknowns lead to to some delays in the schedule but the impact of these delays are being minimized.

Question. I know there have been some delays by the contractor. I wonder if this has had some impact? If so, would you please share with me your thoughts regarding the impact?

Answer. The original schedule for the completion of the Space Launch Complex 4E (SLC–4E) 16 months after the launch pad was turned over for modification. The current schedule shows the facility being completed after 20 months of work. The impact will be a delay in the first launch of a Tital IV from VAFB. This is not desirable but we are working this delay into our plans and identifying alternatives. The most important point to remember is that the work must result in a fully operational facility that ensures a safe and successful first launch.

Question. I understand that the Air Force has solicited RFPs from four companies regarding the possible reconstruction of Satellite Launch Complex No. 6 (SLC–6) at Vandenberg for the Titan Missile. Would you please share with me what the Air Force decision-making process will be regarding this project and what your time frames are associated with making a decision to move forward on future possible construction?

Answer. The Air Force has not solicited RFPs from any companies regarding the modification of SLC–6 for use by the Titan IV launch system. However, we are in the middle of a two-phase study which is examining two options for a second Titan IV launch pad at VAFB, i.e., the modification of SLC–6 or the building of a new launch pad (and therefore not using SLC–6) referred to as SLC–7. The first phase brings all qualified and interested companies up to a common level of knowledge about the tasks involved in completing a Titan Launch capability. Four companies were accepted for

Phase I. The output of phase I will be a top-level specification (called the "A-specification") in which each company outlines the tasks it believes should be accomplished to either modify SLC-6 or to building SLC-7. Phase I is expected to be complete by mid-May. From these inputs, the Air Force plans to issue a Request for Proposal this summer on SLC-6/7 (Phase II). This will be an open competition to select a systems contractor and be on contract before the end of 1989.

Question. Are there any companies other than the original four contractors who may submit bids for possible construction that the Air Force may be aware of?

Answer. The RFP will be written so that any contractor can bid, not just the four who participated in Phase I. If a new contractor does bid, he will have to provide the same data as the other contractors. The main item would be the A-specification.

Question. Would you share with me what the current status of Satellite Launch Complex 7 (SLC-7) is and how that might factor into your consideration for rebuilding Satellite Launch Complex 6 (SLC-6)?

Answer. Both Space Launch Complex-7 and SLC-6 are currently under study by the Air Force for use in launching the Titan IV/Centaur. We are in Phase I of a two-phase study which is examining both SLC-7 and SLC-6. The purpose of Phase I was to bring all qualified an interested companies up to the same level of knowledge on the required job in order to form a competitive base. Four companies were awarded contracts for Phase I. The output of Phase I will be a top-level specification (called the "A-specification") in which each company outlines the tasks necessary to either modify SLC-6 or to build SLC-7. Phase I is expected to be complete by mid-May. Phase I will also help in the decision on which facility to build or modify. From these inputs, the Air Force plans to issue a Request for Proposal this summer on SLC-6/7 (Phase II). Phase II will be an open competition for award of the final contract for the facility. The Air Force will conduct source selection on the proposals submitted. The goal is for a systems contractor to be selected and on contract before the end of 1989.

Question. What is the time frame the Air Force has for evaluation, either for construction or remodeling these facilities?

Answer. The Air Force plans to evaluate proposals this summer and fall with the goal to be on contract before the end of 1989. We plan to achieve initial launch in late 1996 or early 1997.

[CLERK'S NOTE.—End of questions submitted by Mr. AuCoin. Questions submitted by Mr. Livingston and the answers thereto follow:]

INDUSTRIAL BASE ISSUES

Question. What organization or office within the Air Force is responsible for industrial base issues?

Answer. The Air Force handles industrial base issues similarly to how most government, industry and academic organizations handle them. We review each specific issue and determine who should be involved. This is absolutely essential because industrial base issues have many facets potentially involving many functions. Most in-

dustrial base issues are national in nature and have political, economic, foreign policy, security, trade and defense implications. For example, they may involve a manufacturing technology challenge that needs to be solved, comments on a foreign trade bill, a technology dissemination issue, or some contracting policy determination. Department of Defense and Air Force regulations are clear to all managers, especially those in acquisition, that they have the responsibility to consider industrial-enhancing opportunities as they develop and execute programs. In this context, the Air Force has begun to institutionalize industrial base considerations into the overall acquisition process. Every program director is asked to work program specific industrial base issues. For example, they must determine the risk versus cost of foreign and dual sourcing. They must consider, with the contractors they work with, appropriate incentives that will produce the highest quality systems to meet operational needs. However, for generic industrial base issues, or for those requiring some budget centralization, the Air Force has an Industrial Base Program Element, PE 0708011F. In turn, each major budget appropriation has an Industrial Preparedness Budget Line. These lines are used mainly for funding the Air Force Manufacturing Technology Program, subcontractor Industrial Modernization Incentives Program activities, major maintenance at the remaining thirteen Air Force-owned industrial plants, Industrial Base Planning, and a dedicated program office to execute the Congressionally mandated Defense Production Act Title III Program. The focal point for these programs and for general industrial base issues is the Directorate of Contracting and Manufacturing Policy located in the Office of the Assistant Secretary of the Air Force for Acquisition.

Question. What programs are in place and initiatives planned to reverse the steady deterioration of the industrial base?

Answer. The notion that the industrial base is deteriorating is well publicized, but, nevertheless, controversial. There is little consensus on how to solve the complex industrial challenges that domestic industries face. Answers and determining how active government, let alone the Air Force, should be in encouraging or funding industrial enhancing initiatives have economic, political, trade, foreign policy and defense facets. It is often difficult to decide just who are the "critical" industries we should help. The Air Force has a difficult problem in that we have limited horizontal visibility into the industrial subtiers. We understand critical items more than critical industries. The Air Force Industrial Base Program has evolved in this era of nonconsensus. Yet, it is considered to be a proactive and an affordable response to the challenge. In the long term, it has the Air Force cooperating with all branches of the government and industry to foster an atmosphere conducive to contractor investment and long term domestic industrial competitiveness. In the short term, the Air Force program focuses around a three-pronged attack. Only the third involves direct funding. First, acquisition and operational planners are working closer than ever to better understand the threat and improve links between industrial capability and operational plans. Second, the Air Force is working to institutionalize industrial considerations in the overall acquisition process. We have rewritten key acquisition regulations

telling our acquisition managers that it is essential to do industrial planning, consider dual sources and to understand foreign sourcing implications. Third, for generic industrial enhancement, we fund a modest, but effective, industrial base program whose elements include industrial base planning, the Manufacturing Technolgy and Industrial Modernization Incentives Programs, maintenance of the remaining thirteen Air Force-owned industrial plants and manning a dedicated program office to oversee the Department of Defense's execution of the Congressionally-mandated Defense Production Act Title III Program.

MODERNIZE PROCESSES AND EQUIPMENT

Question. What initiatives is the Air Force pursuing to modernize the processes and equipment used by industry to produce Air Force systems?

Answer. The Air Force believes that it is our responsibility to write clear and concise requests for proposal and to structure source selections and contracts to encourage contractors to make aggressive capital and modernization investments on their own. It is the contractor's responsibility to make sure their processes and equipment are modern and efficient. However, the Air Force does recognize that in a cost-based pricing system, such as that used in government contracting, there are some disincentives to making aggressive modernization investments. An unstable business environment and other government policies may combine to form additional barriers to aggressive modernization. The Air Force relies on two programs to help mitigate some of the negative conditions that make modernization investment risky. They are the Manufacturing Technology (MANTECH) and Industrial Modernization Incentives (IMIP) Programs. MANTECH is a program designed to solve generic manufacturing technology challenges so that programs will not have to reinvent the wheel. Its purpose is to help transition, and expedite getting laboratory research and development to cost-effective production floor applications. Technology voids are written up in proposals that all domestic industry and universities may competitively bid on. Even though a single team or company may win the research contract, all industry gains because MANTECH projects are disseminated to domestic industries through final reports and end-of-contract demonstrations open to all. In any given year, there are about 70 ongoing MANTECH projects. IMIP, on the other hand, is designed to be a financial encouragement for contractors to modernize. IMIP is an agreement between the government and a contractor in which the government agrees that a contractor will be given a reasonable (negotiated) return on all cost-reducing modernization investments. Contractors are allowed to retain a productivity savings reward on modernization activities agreed to, up front, by the government in an IMIP proposal. The Air Force combined direct funding for MANTECH and IMIP has averaged $90 to $125 million per year. In FY 1990, we request $70.751 million for MANTECH and $24.709 million for IMIP. Since IMIP efforts are cost-reduction oriented and can often be tied directly to several benefiting programs, the Air Force encourages program directors to pursue IMIP as part of their normal contract

deliberations. As a result, there are over 200 prime and subcontractors involved in Air Force IMIPs. The Air Force has invested $533 million in this program with over one-half being funded directly by program offices. Industry has matched Air Force investments with over $1.3 billion as their share of IMIP activity. Cost avoidances expected from these investments are expected to reach $4.1 billion.

AIR FORCE MANUFACTURING TECHNOLOGY PROGRAM

Question. I understand that the Air Force Manufacturing Technology Program received very high marks from 2 recent Manufacturing Studies Board analyses. Is this accurate?

If this is true, why is this program being decreased in FY 1990 by approximately $24 million?

What impact will this decrease have on the Manufacturing Technology Program? Provide specific program details and impacts.

What planned activities or programs are impacted by this reduction

What was the Air Force request for funding this program, before OSD review?

Answer. The Air Force Manufacturing Technology Program (MANTECH) enjoys support from all that have ever reviewed it. In 1986–87, the Manufacturing Studies Board surveyed "The Role of the Department of Defense in Supporting Manufacturing Technology Development" and initiatives that could be a "Cornerstone of a Renewed Defense Industrial Base". Both efforts praised the Air Force's proactive stance on working with industry to enhance manufacturing technology. The Air Force believes in MANTECH and supports a level of effort activity. The program is funded at $70.751 million. The Air Force would like to devote greater resources to the program, however, based on a constrained budget environment, we believe the current level of effort is appropriate. The initial FY 1990 Air Force MANTECH (Industrial Preparedness, Air Force, RDT&E) budget was prepared to support about $100 million effort. Reductions were due to revisions to the overall Air Force and Department of Defense budgets. Reductions were made without prejudice. Instead of tackling all the potential projects, we descoped several, deleted a few, and overall decided to undertake fewer tasks in several of our thrust areas. In our Airframe Production and Producibility Thrust, we postponed tasks that would have looked more at composite manufacturing challenges. In the Propulsion System Thrust, we descoped efforts to improve manufacturing methods for producing metal matrix, shaft and cast rotor components which potentially can help us more quickly take advantage of advances in lightweight, more durable materials that are needed before we can produce a future generation of high temperature engines. In the Electronics Assembly Thrust, we reduced program content on yield improvements targeted at solder techniques for a variety of printed wire board application. We delayed efforts to improve nondestructive evaluation of semiconductor wafers by taking advantage of photon backscattering technology. We deleted manufacturing developments that may someday lead to three dimensional inspection of solder joints on printed wire boards. In the Logistics Repair Thrust, we postponed analyses of commercial produc-

tion application laser technology as it might be related to repair technology. In the Strategic Missile Thrust, we descoped efforts to use Glycidyl Azide Polymer (GAP) materials as a binding material in rocket motors. We reduced efforts to find more most effective ways to make solid rocket propellent using other than ammonium perchlorate that gives off pollutants as it burns.

Question. Since research and development in manufacturing processes and technology is broadly applicable across the Air Force and to commercial industry as well, what impact will the lack of resources to the Manufacturing Technology Program have on the Air Force's ability to hold the line on program costs?

Answer. Solving manufacturing technology challenges continues to be a necessity for all Air Force programs. There has never been a greater emphasis by the Air Force than now on stressing producibility and the smooth transition of weapon system designs from laboratories to production floors. Our acquisition schools and regulations have placed major emphasis on educating program managers as to the importance of upfront and early-in-the-acquisition process considerations of industrial base issues. They must understand what it will take to produce high quality, affordable weapon systems and components. The centralized Manufacturing Technology (MANTECH) Program managed through the Manufacturing Technology Directorate of the Air Force Wright Research and Development Center at Wright-Patterson AFB, funded as an Industrial Preparedness RDT&E Budget line, is a level of effort initiative that has been funded by the Air Force since the late 1940's. Its purpose is generic manufacturing technology process and equipment research and development. The MANTECH Directorate solicits candidate manufacturing technology projects from the Science and technology world, Product Divisions, Air Logistics Centers, domestic industry, the other Services and government agencies, and reviews recommendations that come from annual production base analyses. They then develop a plan for attacking and solving those challenges generically so that each new program will not have to reinvent the wheel. The Air Force has provided stable funding for the program which annually receives about a $70–97 million budget to accomplish about seventy manufacturing technology tasks. The Air Force had hoped to stabilize the program at the FY 1988 funding appropriation of $97 million. However, due to current fiscal constraints, we believe the President's Budget request of $70.541 million will be sufficient to continue an aggressive program. Historical evidence has shown that for each MANTECH dollar the Air Force invests, we have created outyear manufacturing cost avoidance anywhere from two-to-one to fourteen-to-one. We are confident, however, that with the overall emphasis the Air Force places on quality, productivity, and producibility, multiyear contracting, etc., our weapon systems and future Air Force program cost will not be severely impacted by reductions to the MANTECH program.

Question. Wouldn't additional resources or improvements in manufacturing research and technology have a positive impact on holding down high program costs and long lead times for major weapon systems.

Answer. The Air Force already has the most active Manufacturing Technology (MANTECH) program in all the Department of Defense. in addition, we place a high priority on encouraging our contractors to produce effective, high quality weapon systems and components. Air Force program managers are well aware of the criticalness of solving producibility challenges early in the acquisition cycle. We support multiyear contracting, value engineering, the Industrial Modernization Incentives Program, and a variety of potentially cost-reducing programs. The reality is that we have limited resources and program managers must accept this as mostly their responsibility. Of course, if more funds were available, more generic manufacturing research and development could be done. However, determining a quantifiable return on what we might really get from additional investment in these long term manufacturing developments, is very difficult. This makes allocating more of our limited resources to this area controversial. It is impossible to know how much is enough. Nevertheless, the Air Force believes we have found a reasonable level. We support MANTECH and other industrial enhancing activities to the extent that we direct fund about $150 million dollars per year as part of core Industrial Preparedness lines in the budget.

[CLERK'S NOTE.—End of questions submitted by Mr. Livingston Questions submitted for the record and the answers thereto follow:]

B–2 ADVANCED TECHNOLOGY BOMBER

Question. Last December, the Air Force publicly announced that the cost of 132 B–2 "stealth" bombers is currently estimated at $68.1 billion, which computes to a $516 million per unit cost. On March 10, 1989 the Air Force informed the Committee of another slip in the first flight. A March 13, 1989 press report states: During a recent test, "a bleed air system duct was ruptured when either a stuck valve or obstruction caused the system to over pressurize. Damage to ducting and structure—including a titanium metal section—is contributing to schedule slips." Is this true, and if so is it a serious problem?

Answer. This is not true as stated. On February 28, 1989 Air Vehicle 1 experienced an Environmental Control System failure during the proof pressure test. The system was being intentionally overpressurized to approximately 150 percent of maximum to insure a satisfactory margin of safety. Approximately 3 feet of tubing ruptured. The failure has been identified as a nonwelded fitting breaking loose and the fix is now to weld all fittings. All repairs will be complete by early April. This is not a serious technological problem but has impacted the first flight schedule.

Question. Another March 13, 1989 press article states: "The hightech B–2 bomber, priced at $500 million a copy is in budget trouble even before making its now-delayed first flight. The latest fiscal plan being drafted at the Pentagon specifies deep cuts in the program, both short and long term." Please explain.

Answer. The amended budget is currently undergoing coordination in the Department of Defense. Several alternatives are being evaluated which propose reductions in near term years.

Question. Describe your cost-cutting initiatives for B–2.

Answer. There are over 30 engineering producibility projects identified at this time which we estimated will generate ——— dollars in cost avoidance over the life of the B–2 program. In addition, there are over 30 manufacturing producibility projects (MPP) as well as over 40 Industrial Modernization Incentives Program (IMIP) projects which we expect to generate an additional ——— dollars in programs cost avoidance.

Question. Describe your multiyear strategy.

Answer. There exists one multiyear strategy for the two multiyear programs with the B–2 program; the airframe multiyear program and the engine multiyear program. The airframe multiyear procurement program will provide ——— by using one multiyear contract covering buys in fiscal years ———. The engine multiyear-procurement program will provide ——— by using one separate multiyear contract covering buys in fiscal years ———. The use of these multiyear procurement methods will yield cost avoidance as well as other benefits when compared to the conventional annual contracting method utilized for aircraft procurement to date. Specifically, cost savings are expected in the procurement of materials for vendors due to the large quantity by capability offered by a multiyear contract. Additional savings will be realized from a decreased impact of inflation, resulting from obtaining firm prices for future deliveries.

Question. How much up-front investment?

Answer. For the engine multiyear ——— "upfront" investment; and for the airframe multiyear ———.

Question. How much net savings?

Answer. The total projected savings for the engine multiyear is ——— (Then Year Dollars) which represents an ——— savings; for the airframe multiyear, ——— (Then Year Dollars) which also represents ——— savings.

CHEYENNE MOUNTAIN

Question. In a recent hearing, the CINC of the U.S. Space Command advised us to "ask the Air Force" about the chronic management problems with computer acquisitons for Cheyenne Mountain. How will the $118 million requested in FY 1990 be used?

Answer. The $118 million will be spent on the Cheyenne Mountain Upgrade Programs as follows:

	Million
Communications system segment replacement	$47.8
Granite sentry	9.8
Survivable communications integration system	4.3
Command center processing and display system replacement	35.4
Space defense operations center	18.4
TW/AA integration	2.7
Total	118.4

The milestones associated with these programs for FY 1990 are as follows:

CSSR: Complete hardware/software integration and in-plant FQT; begin installation and checkout in the Test Development and Training Center (TDTC); conduct TDTC testing for Block 2; and

begin site surveys and preparation of CMAFS for Blocks I and II installation.

Granite sentry: Complete NORAD Command Post facility upgrades and provide Missile Warning data; complete IOT&E for NORAD Command Post (Missile Warning function); declare IOC; and conduct system requirements review and software specification review for the NORAD Command Post (Space Defense) upgrade.

SCIS; Conduct IOT&E at 6 sites.

CCPDS–R: Conduct Formal Qualification Tests on common subsystem software; conduct DT&E for common subsystem at contractor development test facility; and conduct PDR on SAC unique system.

SPADOC: Conduct Formal Qualification Testing Block B; conduct Block B DT&E; and complete detailed specifications and scheduling of final phase of SPADOC IV, Block C.

TW/AA Engineering: System engineering effort to ensure programs are meeting defined system requirements.

Question. Explain why there was no DAB review of this large initiative. What internal Air Force reviews were conducted?

Answer. The Cheyenne Mountain Programs were spread across 4 Program Elements prior to the FY 1990 consolidation into one PE. As a result, none of these programs were large enough efforts to warrant DAB oversight. After contract award, each of these programs was reviewed at least quarterly by the Director Space and Missile Warning System Program Office, a one star general officer. On behalf of the Electronic Systems Division commander, Mitre Corporation conducted Corporate Level Assessments (CLA) of these programs and reported results to the commander. For CSSR, Mitre conducted status audit CLAs in June 1986 and June 1987. On SPADOC, Mitre conducted a June 1985 technical assessment CLA, in June 1986 a Test Schedule CLA and in April 1987 an IOT&E readiness assessment CLA. AFSC also conducted a Cost Assessment Review on SPADOC in January 1987. In addition, higher headquarters conducted the following reviews on Cheyenne Mountain Programs:

(1) Secretary of the Air Force/AQS and Air Force/XOO reviewed Granite Sentry in February 1988 for production decision for the Air Defense Operations Center.

(2) The Air Force Systems Acquisition Review Council (AFSARC) and the Major Automated Information Systems Acquisition Review Council (MAISARC) reviewed CCPDS–R in February 1987 and June 1987 respectively for the Milestone II decision. The MAISARC delegated Milestone III decision authority to Air Force, which in turn delegated that authority to Air Force Systems Command. AFSC/CV gave the program the go-ahead for Milestone III in January 1988.

(3) The Air Force Council reviewed and approved a December 1987 restructure of the Cheyenne Mountain programs as agreed upon by AFSC and AFSPACECOM to defer program content and align program schedules with funding profiles.

(4) Secretary of the Air Force/AQS and Air Force/XOO received a status briefing from Electronic Systems Division/SR on the Cheyenne Mountain Upgrade Programs in January 1989 in preparation for the upcoming DAB.

B–1B ELECTRONIC WARFARE SYSTEM: STRATEGY TO FIX

Question. The Air Force spent over $3 billion on the B–1B's troubled electronic warfare system, called "ALQ–161". You now plan to spend about $.5 billion of existing funds to "fix" the B–1B's baseline ALQ–161 electronic warfare system, and another $.5 billion with a new contractor to add a separate "radar warning receiver" to the B–1B fleet that was not originally planned. Of the eight frequency bands that the enemy radar operates in, how many will the "final" ALQ–161A be able to jam?

Answer. ———.

Question. How many threats will the system handle at one time?

Answer. ———. It is one element among other elements of the penetration equation. High speed, low altitude, low RCS, tactical route planning and defense suppression are equally, if not more, important than ECM in determining the overall penetration capabilities of the B–1B. ———.

B–1B ELECTRONIC WARFARE SYSTEM: ACQUISITION STRATEGY

Question. Let's discuss your acquisition strategy if Congress were to approve your proposals. How much RDT&E is involved?

Answer. The Air Force plans to install a stand-alone radar warning receiver (RWR) to augment the "core" ALQ–161 program. ———. The FY 1990 budget submission requests a total of $116 million of RDT&E funds in FY 1990/91 for the initial integration of the Air Force common RWR (ALR–56M) into the B–1B. The total RWR program (RDT&E and procurement) estimate is $489 million. While Congress deliberates on the FY 1990/91 budget request, the Air Force is conducting risk reduction studies to optimize design integration approaches.

Question. How much concurrency exists in your program?

Answer. There is no concurrency in the "core" effort with the ALQ–161 system; however, the RWR will require long lead authorization prior to completion of flight test.

Question. How much flight testing of the "final" ALQ–161 along with the integrated ALR–56M radar warning receiver would be accomplished prior to a production decision to purchase additional hardware?

Answer. Six months of flight test (10 sorties) is currently scheduled for the ALR–56M on the B–1B. This testing will span the 4th quarter of FY 1991 through the 1st quarter of FY 1992. After the completion of flight testing, a Group B production decision will take place. This event is scheduled for the 2nd quarter of FY 1992.

Question. What would we do if the flight tests were unsuccessful, as was the case in the ALQ–161A?

Answer. The integration of the ALR–56M RWR on the B–1B has been assessed by the Air Force to be low technical and business risk. The Air Forc does not anticipate a failure on the integration with the B–1B.

Question. Discuss the alternative electronic, warfare systems, that could be adapted to the B–1B (e.g. B–52's ALQ–172, F–111's ALQ–189, F–15's TEWS etc.). How many of these alternatives have been already flight tested on a B–1B to provide real data for comparison to your proposed solution?

Answer. From an initial list of twelve options, the six most promising candidates were selected for detailed Air Force evaluation. This group included two options with the current ALQ–161A contractor, two options involved with radar warning receivers, one option with the ALQ–172, and finally an option with advanced expendables. After a rigorous technical and business review, the Air Force elected to pursue the current plan which includes a "core" ALQ–161A and a radar warning receiver. None of the alternatives have been flight tested on the B–1B.

Question. How much "expired funds" will be used to finance this initiative, and of this how much was originally appropriated for the B–1B?

Answer. The RWR requires $489 million in new budget authority. The projected total cost of the "core" ALQ–161A effort is $725 million. This figure includes $96 million for development, $519 million for correction of deficiency retrofit of prime mission equipment (PME), and $100 million for spares retrofit. Of the $725 million total requirement, $199 million will be financed from active B–1B R&D and procurement accounts while $526 million is being sourced from expired/lapsed appropriations.

To date, it is estimated that over $500 million in B–1B appropriations have been placed in expired/lapsed status with the resultant loss of B–1B identity. The B–1B requirements from the expired/lapsed appropriations totals $1.032 billion.

Question. Why is use of "expired funds" preferred over requesting new appropriations from the Congress?

Answer. The contracting offices have determined that the "core" efforts are within the scope of the original B–1B contract with Eaton. In addition, the Air Force General Council has concurred in the appropriateness of using expired/lapsed funds to cover these contractual liabilities.

B–1B ELECTRONIC WARFARE SYSTEM: TROUBLES IN DEPLOYED FLEET

Question. Let's discuss the B–1B's existing, deployed ALQ–161 system. Does it work?

Answer. The key operational technique works (1122). However, the currently fielded ALQ–161A system provides only a limited receive and jam capability against SAC's Top 11 threats ———. The "core" program will enhance this system's utility.

Question. How much more RDT&E work remains?

Answer. The RDT&E for the "core" program is $96 million. The development program will last until early 1991.

Question. Does each of the 97 deployed B–1B's have an exactly identical ALQ–161 electronic warfare system?

Answer. No. Aircraft 2 through 18 have an early configuration of hardware. These aircraft will be modified under the "core" program, beginning in early 1990 and lasting until May 1991.

Question. Do your maintenance personnel have sufficient technical data and configuration control to effectively maintain the deployed ALQ–161 system?

Answer. Technical data exists in sufficient quantities to effectively maintain some portions of the ALQ–161A system. However, the ALQ–161A does not have full organizational, intermediate or depot

("O", "I", and "D") level organic maintenance capability at this time. Central Integrated Test System (CITS) maturation is required to achieve a full "O" level capability and this will not be available until the "core" program is complete. Currently, "I" and "D" maintenance of the system is still dependent on Interim Contractor Support (ICS).

Question. How much of the ALQ-161 organizational (O level), intermediate (I level), and depot (D level) level maintenance is done in-house by the Air Force?

Answer. At the O level, all maintenance is performed by Air Force personnel using iterim support equipment and technical data as a work around for an immature O level maintenance diagonostic capability (i.e. Central Integrated Diagnostics System—CITS). Regarding intermediate repair capabilities, currently SAC has the capability to test and repair one line replaceable unit (LRU) at the I level. For depot repair, the Air Force has an interim repair capability for approximately 5 percent of the ALQ-161 at the depot level.

Question. How much do you plan to spend on "interim contractor support" with the B-1B defensive avionics system contractor to help Air Force personnel maintain the aircraft fleet? We understand this is an imprecise area: give us a ballpark estimate. How many billion? When will the ALQ-161 ICS end? What are your plans for competing it?

Answer. The ALQ-161 ICS costs for the B-1B from FY 1985-89 total $76 million. The projected ICS costs for FY 1990-92 are $25 million, $22.75 million and $27.25 million. ICS will end when the Air Force has an organic repair capability for the ALQ-161. There are no plans for competing ICS.

Question. Provide for the record planned funding for all B-1B interim contract support in each fiscal year 1987 to 1994.

Answer. The following funding is in millions of dollars.

Fiscal year:	
1987	$73.4
1988	104.5
1989	106.5
1990	97.5
1991	97.3
1992	46.5
1993	39.2
1994	26.3

B-1B FUTURE ENHANCEMENTS

Question. An August, 1988 CBO report identifies $7.9 billion of possible enhancements for the B-1B, such as: monopulse radar countermeasures ($1.4 billion), high-resolution infrared targeting sensor ($1.0 billion), forward warning system ($7.0 billion), SRAM-II ($0.6 billion, on-board mission planning system ($0.6 billion), improved synthetic aperture radar ($0.6 billion), reliability and maintainability enhancements ($0.6 billion), and numerous others. What exactly is the Air Force plan for such capabilities?

Answer. The Air Force is not planning $8 billion in enhancements for the B-1B. During a fiscally unconstrained Air Force planning exercise, a list of possible B-1B enhancements was created; however, most of these enhanced capabilities did not have supporting operational requirements and were therefore discarded.

Question. Do you plan to eventually fund all of them?

Answer. In the Five Year Defense Plan, the Air Force has programmed $1.4 billion for investment in the B–1B. This reflects the prudent first step in the evolution of the baseline B–1B to sustain its warfighting capabilities into the next century.

Question. What criteria do you use for determining which is the most important?

Answer. The primary criterion for determining the appropriateness of investing in the B–1B is operational requirements, based upon mission needs.

ICBM MODERNIZATION

Question. No decision is expected on Small ICBM versus rail based MX until at least April 3. The FY 1990 budget requests $789 million, all for MX, none for Small ICBM.

As we discussed with General Welch a few weeks ago, the more the Air Force studies the Small ICBM, the more its cost drops. Discuss the costs and assumptions behind the original SICBM Air Force cost estimate; the current estimate; the new RAND estimate; the new AF Ballistic Missile Office estimate; and a dual warhead version of SICBM.

Answer. Programs, costs and assumptions for Small ICBM cost drops are provided below:

[Dollars in millions]

Program	*Acquisition Cost**
Original Small ICBM Air Force cost estimate:	
Milestone II Decision Baseline (Aug 86)	$38.4
500 UE, single RV, 3 Minuteman bases, Dec 92 IOC	
Baseline (Jul 87)	33.8
500 UE, single RV, 3 Minuteman bases, Dec 92 IOC	
RDT&E reduced because of FSD competition	
Production costs reduced based on FSD contract data	
Updated baseline (Jan 88)	30.7
500 UE, single RV, 3 Minuteman bases, June 93 IOC	
RDT&E reduced because of AINS, Dual Propulsion source and technical database management system deletions	
Production reduced because of engineering change order (ECO), ceiling funds and A&CO spares reduction	
Current estimate—New Air Force Ballistic Missile Office estimate:	
Technical Restructure (Oct 88)	26.8
500 UE, single RV, 3 Minuteman bases, CY 94 IOC	
RDT&E reduced because of flight tests, hard mobile launcher (HML) test units and ECO reductions, revised estimates and use of DT&E IRSS	
Production reduced because of A&S hardware, logistics support equipment, ECO and ceiling fund reductions	
Dual warhead version, small ICBM cost estimate:	
2-RV alternative (Oct 88)	18.8
250 UE, 2 RV, 1 Minuteman base, CY 94 IOC	
Cost reduction because of production quantity reductions	

*Cost in billions of FY 88 dollars (includes $3.0 billion spent through FY 88).

NEW RAND ESTIMATE

The new Rand 15 year Life Cycle cost to go is $29.8 billion (FY 1988). The comparable Air Force Life Cycle cost to go is $27.7 billion (FY 1988).

	Billions
Technical Restructure Total Acquisition—from above	$26.8
Spent through FY 88	−3.0
15 years of O&S	+3.9
15 year Life Cycle cost to go	$27.7

Question. The FY 1990 budget requests $101 million for R&D on the deployed Minuteman ICBM, up from $60 million last year. What is the requirement for this level of Minuteman R&D? Could it be deferred if Small ICBM is pursued?

Answer. The increase is driven by the Rapid Execution And Combat Targeting (REACT) program's second year of RDT&E. These funds are required to support the REACT program which addresses supportability, operability, and reliability for Minuteman launch control centers and cannot be deferred to Small ICBM.

Question. The Air Force's budget justification for the Advanced Strategic Missile Systems (ASMS) program is poor, considering the request for $99 million in FY 1990. Explain what ICBM component programs are being conducted within this line and why. Address: Evader Replica Penetration Aid; Earth Penetrating Weapon; Advanced inertial guidance units; Strategic Relocatable targets; Technology development "vehicles" (new missiles?); Pyrotechnic and other penetration aids; Advanced boost-phase guidance; and Maneuvering System Technology (MaST).

Answer. Evader Replica Penetration Aids. This effort funds the development of penetration aids to accompany a maneuvering reentry vehicle (MaRV). It provides multiple targets that match the RV during its flight outside the atmosphere and during early reentry until the MaRV reaches an altitude where it can begin to outmaneuver interceptors. It matches the RV's radar and optical signatures during flight outside the atmosphere and continues to match the radar signature at high altitudes within the atmosphere. Together with MaRV technology developments, this effort can lead to a robust defense penetration system against optical discrimination use by the defense or a nation-wide breakout of ABM interceptors.

The accompanying MaRV technology developments focus on developing radiation hardened electronics and advanced inertial measurement units to guide the MaRV during reentry evasion maneuvers. Also includes materials technology applicable to MaRVs such a nosetips, collars and antenna windows.

The effort is required to respond to the ever increasing Soviet ABM threat. The potential for discrimination between RVs and decoys using new spectra (optics) make current penetration aid designs of limited life. Better simulation and maneuverability are required to respond to improved discrimination and hotter interceptors of the future.

Earth Penetrating Weapon. Funding limitations permit only a small concept development effort for a ballistic missile-delivered earth penetrating weapon. A ballistic missile-delivered MaRV carrying a ballistic missile-delivered earth penetrating warhead would provide the most robust option to counter deeply buried, time-urgent, targets. The concept would provide the accuracy, ABM penetration, promptness and optimal delivery conditions for deeply buried target attack. Mobile ICBMs and SLBMs could provide the

survivable basing so that the weapons could be withheld until the decision was made to attack these targets.

The funded effort focuses on conceptual designs for potential systems and wind tunnel testing of candidate reentry vehicle control concepts. Its only product is paper studies. The present effort will conclude in FY 1990.

The effort is necessary because the Soviets have sought to put certain assets in a sanctuary where they would be safe from attack. These assets include civilian and military leadership and other facilities. The capabiity to hold those targets at risk increases deterrence by removing Soviet damage limitation capability.

Advanced Inertial Guidance Units.—As part of the MaRV development effort, the ASMS program continues to develop the guidance systems that would guide the MaRV during its evasion maneuvers during reentry. Current concepts focus on smaller, lighter and more accurate ring laser gyros. The principal issues are reducing size, increasing radiation hardening and reducing cost. These guidance systems would only seek to maintain the accuracy provided by the missile guidance system, although some improvement might be noted because the system could sense deployment errors and wind and density variations during reentry.

This work is necessary to provide lighter and cheaper guidance systems for MaRVs so that they can be more easily carried on current ICBMs and so that they can maintain accuracy despite maneuvers and nuclear blast encounters with ABM interceptors at close range.

Strategic Relocatable Targets (RTs).—ASMS efforts in FY 1990 will conclude concept definition studies for an ICBM capability to counter RTs. Based on the results of these studies, we will begin development of the most near-term concept—an ICBM-delivered air breathing vehicle with loiter capability to locate, discriminate and attack RTs. The initial effort would select potential sensor suites and begin integration efforts. Sensors would likely be chosen from those under development for aircraft RT weapon platforms. The effort would continue over several years.

This effort is required to provide a U.S. capability to hold relocatable targets at risk with prompt response weapons to limit damage to the U.S. The problem of relocatable target attack in general is so difficult that alternative weapon system approaches (aircraft, ICBM and SLBM) must be pursued.

Technology Development Vehicles.—Technology development vehicles are reentry vehicles which are test beds for gathering reentry environment effects on candidate advanced reentry subsystems and components. They will be used to provide test flight vehicles for pyrotechnic penetration aid subsystems, Advanced Inertial Measurement Unit (AIMU) performance evaluation under reentry conditions, and nosetip and antenna window material testing.

These vehicles provide a flexible carrier vehicle capable of handling multiple experiments and maintaining equipment commonality. The program takes advantage of Minuteman III Operational Testing Flights to reduce range costs and reduce the risk of each flight. The vehicles use a proven vehicle shape to enhance reliability.

Pyrotechnics and other penetration aids.—Pyrotechnic penetration aid technology is being developed to provide an optical masker to counter endo-atmospheric optical discrimination. The technology consists of a bright-burning module attached to both RVs and decoys that mask the optical signature of the carrier. The defense's optics would then be unable to discriminate between decoys and RVs. This technology would be used together with some system that matches masks the radar signature of the RV.

Another effort is developing a system to ride on/in the RV and decoy to mask the radar signature during reentry. This effort will end prematurely in FY 89 due to funding limitations.

These technologies are required to provide countermeasures applicable to ballistic reentry vehicles (like the MK12, MK12A, MK21 currently deployed on Minuteman and Peacekeeper). The two programs together provide a solution to potential Soviet optical discrimination, which must be considered for the long term, especially if other discrimination techniques are denied (by decoys).

Advanced Boost-phase Guidance.—Our efforts in advanced boost-phase guidance primarily focus on three technologies to achieve solid state inertial sensors (accelerometers and gyroscopes). The first of these is the vibrating beam accelerometer that measures the reaction of a vibrating quartz beam to acceleration. It promises to be much simpler and cheaper than the specific force integrating receiver (SFIR) used in Peacekeeper AIRS. It will provide much higher reliability and replaces 840 moving parts in the SFIR with 15.

The second technology is the hemispherical resonating gyro, which measures rotation and rotation rate by sensing the movement of induced vibrational patterns on a hemispherical globe. This is a longer term development that will probably not be available until the 21st century, but will provide a solid state gyro that is simpler, more reliable, and has the potential for semidormant operation.

The final technology is the zero lock gyro, which seeks to modify ring laser gyro technology to give an accurate, solid state gyro with no moving parts. This effort supports the AIMU effort for MaRVs.

These efforts are critical because current guidance systems are enormously expensive to procure and to maintain. Accuracy is achieved through extreme complexity which drives costs up and reliability down. Additionally, Minuteman guidance systems are aging, and the few alternatives that exist are very expensive. Next generation guidance systems take a long time to develop (10–15 years), so work must begin now to provide the technology for useful upgrades/replacements and for next generation ICBMs.

Maneuvering System Technology.—This is a flight test program to test material concepts for nosetips, antenna windows and control systems. The scheduled launch is in the first quarter of FY 1990. The experiment is required to verify the performance of these materials and control concepts in a flight environment. These environments cannot be fully simulated on the ground. The development is part of a continuing technology development effort to improve performance of MaRVs and understand material and control performance.

Question. Provide for the record funding in each fiscal year 1989 to 1994 for each ASMS initiative and its total projected cost.

Answer. See Table 1. Breakout of ASMS Program funding.

TABLE 1.—BASIC ASMS PROGRAMS

[Dollars in millions]

	Fiscal year—						Total
	1989	1990	1991	1992	1993	1994	
Evader replica	$12	$16	$16	$19	$16	$12	$79
Earth penetrating warhead	18	2	0	0	0	0	2
Advanced inertial measurement unit	25	22	10	13	0	0	45
Strategic relocatable targets	16	22	37	43	63	70	235
Technology development flights	13	10	10	4	0	0	24
Pyrotechnic decoy	21	3	12	8	3	0	26
Advanced guidance	10	15	8	7	8	0	38
Maneuvering systems technology	3	0	0	0	0	0	0
Subtotal	118	90	93	94	90	82	449
Other technology development programs:							
Survive/endure/launch	6	3	0	0	0	0	3
Boost/guidance missile technology	1	0	0	0	0	0	0
Defense penetration	16	6	6	4	8	16	40
Other subtotal	23	9	6	4	8	16	43
Total	141	99	99	98	98	98	492

Note: Funding requirements for the component efforts are not individual contract costs. They include loaded costs (e.g., launch support, lab support, government furnished equipment and testing, systems engineering/technical assistance support).

ADVANCED CRUISE MISSILE (ACM) PROGRAM

Question. The Advanced Cruise Missile is in trouble, and as a result Congress denied the procurement funding request last year. Explain your current "restructured" (again) acquisition strategy, particularly the cost effectiveness of dual sourcing.

Answer. The current acquisition strategy preserves the option to go dual source. It will continue the low rate production of ——— missiles during fiscal year 1990 and ——— in 1991. Those would be split ——— between the prime contractor (General Dynamics Convair Division) and the second source (McDonnell Douglas Missile Systems Company). In fiscal year 1992 full-rate production of ——— missiles per year would commence with an annual competition for the remaining ——— of the ——— total programmed buy.

Using conservative estimating procedures, our current models predict we'll recover the nonrecurring second source qualification cost, the increased initial procurement cost of second source production, and save approximately $150 million over a single source procurement. Recent competition between General Dynamics and McDonnell Douglas on the Tomahawk program indicates that the saving could be considerably greater.

DEFENSE SCIENCE BOARD ON SPACE ISSUES

Question. A 1988 summer study of the Defense Science Board reached some significant conclusions about deficiencies in today's military space capability. I'd like to read some quotes from that study, and have you address each in its turn. "Satellites cost as much as $100,000 per pound. This is more than experienced in

either national programs or commerical programs. Some changes could yield up to 30 percent savings in satellite costs." (In fact, a recent industry study came to a similar conclusion). What is the Air Force doing to reduce costs? Specifically, are there ways to streamline acquisition by getting rid of unnecessary overhead and overseers? For the record, provide, by program, the number of FTE staff (military or civilian) assigned by the Air Force at or near contractor facilities whose primary responsibility is to oversee, review, or audit space programs.

Answer. According to the Defense Science Board study, the cost of satellites ranges from $20,000 to $100,000 per pound. While that represents a substantial range, on average satellites cost around $50,000 per pound. That same DSB study concluded that the two most significant things that can be done to reduce costs for acquiring space systems are to order systems in economical, multiple buys, and to ensure programs are adequately funded at the start, with funding continuity and stability maintained throughout the program. These two actions were each projected to save at least 10–20 percent of the cost. The Air Force has entered into multi-year procurements for all existing satellite programs (DSP, DMSP, GPS, and DSCS). Milstar has not yet entered production, but the Air Force plans to request multi-year funding for that program as well. In addition, the Titan IV booster program is using the multi-year approach for our heavy-lift vehicle procurements. We also addressed multi-year arrangements for both the Atlas II and Delta II programs, but because of the fewer number of vehicles as well as the opportunity to procure these vehicles at commercial prices, we determined it was not economically prudent to pursue multi-years in these specific instances. In terms of funding stability, the Air Force, through the President's Budget, proposes a level of funding required to maintain a stable program and to avoid costly stretchouts.

The Air Force maintains a level of oversight necessary to ensure that the systems designed and manufactured do, in fact, meet our requirements. The oversight requirements (surveillance, audits, reports) are established by various Federal and DoD regulations and directives. Staffing levels are determined by the size, complexity, and development stage of the programs on contract and may be augmented if problems develop. Streamlined acquisition techniques have been applied on a number of space programs, most notably on Atlas II and Delta II, and will continue to be applied to future programs.

Generally, our space System Program Offices do not have relies on plant visits from Program Office personnel as well as cognizant plant representative offices already co-located with the contractor—whether is is an Air Force Plant Representative Office (AFPRO) or a Defense Contract Administration Service Plant Representative Office (DCASPRO). Because those PROS are concerned with all the programs at a given facility, personnel are assigned to specific functional areas such as engineering and quality assurance. They provide support to individual programs as required. Based on the workload at the individual contractor's facilities, we have pro-rated the level of effort provided by these PROs for each

program. The following table summarizes the full-time equivalent level of effort for our major space programs.

Program	Contractor	Organization	FTE Staff
DSP	TRW	AFPRO	16.3
DSCS III	General Electric	AFPRO	17.6
DMSP	General Electric	DCASPRO	3.5
GPS	Rockwell	AFPRO	2.5
Delta II	McDonnell/Douglas	DCASPRO	15.0
Atlas II	General Dynamics	DCASPRO	10.0
Titan II	Martin Marietta	AFPRO	12.6
Titan IV	Martin Marietta	AFPRO	32.9

Question. "Ground control installations are at a limited number of fixed locations and in some cases overseas. The architecture, as designed, contains limited redundancy and is fragile from a connectivity standpoint. The current architecture does not adequately support operational commanders."

Answer. Space system survivability includes the satellite, the associated data/control links, and the ground station infrastructure. One of the common myths is that military satellites lack survivability, when, in fact, our systems are generally very survivable. There are also substantial and expanding survivability measures for the links. On the ground, space-related assets still require enhancement, to include reducing, where possible and practical, our reliance on overseas facilities. Survivability is a key tenet of the goal toward assured mission capability. Among the survivability alternatives that are employed or being considered to support the ground segments are: proliferation, mobility, hardening, optimized antenna placement, and physical security. A range of link options have also been either employed or are under consideration, including antijam, crosslinks, and encryption.

With regard to support of operational commanders, they already receive a heavy volume and wide variety of timely space-derived information. The matter of additional and ever more timely and survivable data dissemination is an issue that is constantly being addressed, and there are mechanisms in place to respond to this requirement. The growing dependence on space by our operational forces is recognized and continuing measures to enhance their understanding and to meet their needs is a constant process. In essence, we have made substantial investments in space system survivability to assure data will be available to the users during requisite levels of crisis and conflict. Additional measures are projected as survivability and dissemination are assessed throughout the development, acquisition, and operations phases of our space programs.

Question. "Our launch facility complexes have become filled with unique, one-of-a-kind facilities. This leads to very long launch sequences, limited throughput and vulnerability to accidents, natural disasters, and terrorism in peacetime and to sabotage and cheap shot attacks during conflict. A comprehensive program is needed as the cost and politics are substantial."

Answer. It is true that current launch facilities are both limited and vulnerable. Security upgrades are underway to reduce this vulnerability, but it is important to note that any location will remain subject to a degree of vulnerability, whether on the coasts or within the interior CONUS. Cruise missiles or special purpose/terrorist teams will always be a potential threat, regardless of location. We are improving physical security against the terrorist-type threat. We also have multiple launch pads for some or our launch vehicles. In the event of an accident, we could continue launching those types of vehicles but, depending on the extent of damage, possibly at a reduced rate. The solution to the problem of unique facilities is the Advanced Launch System family of vehicles. The ALS concept will require a much simpler payload-to-booster integration process that will decrease the turn-around time for launching payloads and decouple payloads from specific launch vehicles. Lowering the cost of launch, reducing the personnel infrastructure, employing advanced technology, and achieving assured mission capability are critical goals of the ALS program. This program will continue to receive important emphasis to meet the projected threats and mission requirements.

LAUNCH DELAYS

Question. The Space recovery program, put into place following the Challenger disaster, called for an ambitious development schedule for two new expendable launch vehicles, the Titan IV and the Delta II. Each of these programs has slipped several months due to technical problems and other issues. What is the status of these launch vehicle programs today?

Answer. Titan IV status: The Titan IV program achieved its Initial Launch Capability (ILC) on 12 February 1989. This is only 3½ months later than originally planned. The Titan IV was ready to launch at this time but, due to conflicts with the Shuttle, the Department of Defense decided to delay the first launch until after STS–30. STS–30 launched on 5 May and we successfully launched the first Titan IV on 14 June. Following this launch we have begun to modify the launch pad to handle Centaur upper stages and the new solid rocket motors (SRMU). Modification will be done in two stages with a launch scheduled at the end of the first stage. Pad modification will be completed in 3rd Qtr FY 1990.

Delta II: Status: The Delta II launch vehicle program is making progress toward recovering the schedule lost to initial development problems. The first Delta II was successfully launched on 14 February 1989 (less than 25 months after program initiation), carrying a NAVSTAR II Global positioning system (GPS) Satellite. The second GPS was successfully launched on 10 June. Two more launches are scheduled for FY 1989, with subsequent launches of five per year continuing through FY 1993. The Delta II development and qualification program is complete, except for the remaining qualification testing for some of the components of the new, higher performance, Graphite Epoxy Motors (GEM). The GEMs will be used on the 7925 model Delta II that will be launched in the fourth quarter of FY 1991 to support the heavier GPS IIA satellite. Booster production, which experienced some startup problems, is now progressing well and is expected to be back on schedule by the end of calender year 1989.

Question. We assume there will be savings from these delays. What is the current estimate of these savings in FY 1989 and in FY 1990?

Answer. We do not anticipate any savings as a result of the slip in the launch date. The program is continuing development for the Centaur upper stage, the no upper stage configuration and the SRMU. None of these developments are tied to the launch date slip. Therefore we expect no savings. There are additional costs associated with the launch slip. The main reason for the slip was that a redesign and requalification was required for the payload fairing. A design deficiency was discovered in acceptance testing and it has been corrected. This took time and extra money to do. Additionally, more work was required in initial launch activity required to keep the Titan IV ready for launch. This required more O&M funds than originally planned.

The Delta II Program achieved its Initial Launch Capability (ILC) on 14 February 1989. This was only four months later than originally planned. Launch activity, funded by the O&M appropriation, was increased in an attempt to keep launch dates as close as possible to the original schedule. Launch site activity costs from September through February exceeded the funding planned for this time frame. The program office and the contractor are currently in negotiations for a credit to the government for contractor liabilities for the program slip. This credit will be applied against O&M requirements to offset some of the higher than expected FY 1989 costs. No excess funds are expected due to the O&M efforts to recover schedule and unanticipated work required to correct problems in hardware production and qualification experienced in FY 1988.

DEFENSE SUPPORT PROGRAM FOLLOW-ON

Question. In your view, at what point in the Boost Surveillance and Tracking System (BSTS) schedule should we abondon further improvements to the existing system?

Answer. At no point should we arbitrarily abandon further improvements to the existing system. Improvements, upgrades and/or equipment modernizations should continue to be made as long as the operational benefits gained outweigh the associated costs. We must carefully distinguish between improvements and replacements, however. The present system has been in operation for almost two decades. Some of the ground systems are operating with old, outmoded, obsolete equipment which has become increasingly difficult and more expensive to maintain. The software has evolved and grown over the years into a conglomeration of languages, modifications, and additions that is also increasingly difficult to maintain and operate, and threatens the continued high level of performance required. Some gain in performance and capability is a natural fallout of correction of these problems because of the infusion of new technology and methods, but is not always the primary purpose. Naturally, each improvement/replacement will need to be judged on its own merits including future operational longevity. The Air Force has been weighing these tradeoffs ever since the BSTS development began and will continue to do so in the future.

Question. Given the critical nature of the early warning mission, and the fact that the first BSTS satellites may only include the capability for early warning (and not SDI or other requirements),

would you be more comfortable if budgetary control for BSTS full-scale development resided with the Air Force now, to ensure that these schedules will be met?

Answer. We would feel more comfortable if budgetary control for BSTS full scale development resided with the Air Force. If TOA for BSTS were to be transferred to the Air Force, provisions should be made to insure that the SDI schedule for BSTS would be maintained and that the transferred funds would be used only for BSTS. Currently we are working closely with the SDIO to insure Air Force requirements are met.

Question. Current plans call for the last DSP satellite to be procured in FY 1993. Assuming this, when must BSTS achieve IOC to avoid degradation of our early warning capabilities?

Answer. The predictive tools that we have historically used for this vital mission area indicate that BSTS must achieve IOC by ———.

Question. The Air Force is requesting $70 million in FY 1990 to begin a major upgrade to DSP's "satellite readout" station. However, this will not finish development until FY 1993, which is only four years before the first DSP ground stations are shut down. Given those schedules, how is such an effort justified?

Answer. The term upgrade is an unfortunate misnomer which has been applied by the Air Force to the replacement of equipment which was installed in the early 1970s. The maintainability of this equipment is rapidly deteriorating. Parts for most of this equipment are no longer manufactured, and in some cases, the original manufacturer is no longer in business. Downtime is increasing, but operations continue without interruption because of two factors: the redundancies that are available to assure mission accomplishment, and the exceptional abilities of the senior enlisted personnel at the sites to perform self-maintenance on these systems. As the basic equipment gets older, even the redundancies will break down, and the senior enlisted personnel are quickly approaching retirement and will not be available. If this equipment is not soon replaced with more maintainable, modern replacements, mission availability will decline. With today's BSTS schedule, the earliest time that a DSP ground station will be shut down will be in ———. The last ground station will not be shut down before ———. The current equipment would be ——— by that time—totally obsolete, antique for electronics, and completely unmaintainable. By contrast, the replacement equipment will be used four year at an absolute minimum, and most likely ten years.

Question. The committee is advised that there may be some significant problems in the performance of the most recent DSP satellites. Would you summarize their performance and explain corrective actions being undertaken?

Answer. First, let me state unequivocally that DSP continues to perform the TW/AA mission in a superb manner. The latest semi-annual performance report from USSPACECOM states that the DSP system reported ———.

SATELLITE CONTROL NETWORK

Question. In an August 1988 report, the General Accounting Office found that Satellite Control Network upgrades in Colorado and California were not meeting performance objectives and had significantly overrun cost estimates by about $1 billion.

The Air Force response to the GAO's findings was that "requirements changed over the course of development". Yet, when these upgrades were begun, future plans for major space systems were well known. What requirements were changed, and why was their cumulative impact on our satellite control capacity not foreseen?

Answer. The two major Air Force Satellite Control Network (AFSCN) upgrades discussed in the GAO report are the command and control system (CCS) upgrade performed by the Data Systems Modernization (DSM) program and the addition of a second major satellite control node under the Consolidated Space Operations Center (CSOC) program. The requirements for DSM and CSOC have evolved since they were originally baselined in the early 1980's. While it is true that planning for many of our space systems was under way when the DSM and CSOC programs were originally conceived, specific satellite control requirements for individual space systems were in various stages of definition depending on where each satellite program was in its development. By necessity, DSM and CSOC requirements were iterated to insure responsive support to all the space systems they were intended to support as requirements for these systems evolved. This process translated directly into growth in the number and complexity of satellite contacts which must be supported with the DSM and CSOC systems and the growth in the size and complexity of the DSM software development to over 2.5 million lines of application code. In addition, the initial DSM and CSOC requirements did not envision having to support the compressed launch schedules resulting from the space launch recovery effort. The AFSCN will continue to evolve, as it has over the last thirty years, in order to maintain responsive support to existing and new space systems. As new satellite support requirements are levied on the AFSCN, including CSOC, we can expect modifications and upgrades to insure compatibility between the space and ground systems.

Question. The GAO reports that the Air Force now plans to spend $1.85 billion to make these systems operational. The original estimate was about $600 million. What caused such large cost growth?

Answer. The $1.85 billion figure reported by the GAO is a representative approximation of the cumulative CSOC and CCS acquisition costs. The total DSM contract value at completion was $457.7 million and the total CSOC acquisition costs are expected to be approximately $1.1 billion. The GAO estimate of $1.85 billion included approximately $300 million of operations and maintenance cost in their CSOC figure which should not be attributed to CSOC acquisition costs. The GAO estimate of $600 million included the original $195 million DSM contract value in December 1980 and a $402 million estimate for a minimal satellite control capability in Colorado from a 1980 Air Force study. The study estimate was not a baseline estimate or contract cost for the CSOC program. In addition, it did not include dedicated CSOC communications, dual-node range control and scheduling, a training program, or some of the current buildings. The DSM increases were due to evolution of system requirements over the course of the program (increases in the number and complexity of satellite contacts, higher satellite launch rates due to space launch recovery). In addition, schedule

extensions caused by funding profile limitations and the complexity of integrating the new command and control system while simultaneously supporting AFSCN operations also drove up the program costs. The CSOC increases are due primarily to: reassignment of the satellite programs to be based at CSOC; addition of requirement for launch/early orbit support at CSOC; addition of dual-node scheduling and control; addition of an extensive training program for CSOC military crews; addition of direct CSOC connectivity to all remote tracking stations; addition of a competitive contract phase for communications definition; addition of the Operations Command Center (OCC); redefined integration support requirements to include total activation of Falcon AFB and multiple operational capability milestones versus a single IOC; extended integration support due to revised program baselines and subsequent schedule slippage; need to integrate CSOC into the existing AFSCN without impacting on going operations and transition satellite programs from Sunnyvale to CSOC and revised estimates for better defined physical security requirements.

Question. After significant problems under the original contract, the Air Force closed that contract in December, 1987. It then issued a follow-on contract—sole source to the same bidder—on a cost plus basis. Why wasn't this work completed?

Answer. The DSM contract was not closed due to significant problems. The system delivered by the DSM contractor was accepted by the DSM program office against contractually specified requirements. Approximately 95 percent of the contractual specifications were demonstrated and accepted. The remainder were the basis for a credit of $2.7 million to the government by the contractor during the closure of the contract in December 1987. The Command and Control Sustaining Engineering (CCSE) contract is an ongoing maintenance and operational engineering support contract awarded in January 1986 (23 months prior to the end of the DSM contract) to provide continuing engineering, maintenance and modifications support. Every system in the AFSCN requires contract support of this type.

Question. In retrospect, do you feel that normal market incentives such as competition would have resulted in better contractor performance?

Answer. The Data Systems Modernization (DSM) contract was a competitively awarded system development contract. Three study contracts were awarded in July 1979 to perform systems and requirements analysis, as well as the preliminary design for the new command and control system. All three contractors competed for the system development effort with the contract award going to IBM in December 1980. IBM was selected as the CCSE contractor in January 1986 because they were uniquely qualified, with sufficiently thorough knowledge of the new CCS system architecture and software to provide adequate software maintenance and engineering support to critical space programs dependent on the system for launch and on-orbit operations. The Air Force intends to compete the CCS sustaining engineering effort as soon as the system completes transition to operational status and qualified alternative sources are available. To promote competition, the Air Force has directed that IBM subcontract significant portions of the

CCSE effort and is involving other AFSCN support contractors directly in the "beddown" of the new CCS systems at Onizuka and CSOC. Safety of the satellites supported by the CCS system and the criticality of ensuring uninterrupted support to each satellite's operation makes it imperative that the CCSE contractor be fully qualified to assume his responsibilities from the outset.

TITAN IV

Question. The Air Force requests $354 million in RDT&E and $248 million in procurement in Fiscal Year 1990 to continue the Titan IV Expendable Launch Vehicle program. The Titan IV is the Air Force's largest ELV, and is needed to launch heavy mission payloads.

General, first launch of the Titan IV has now slipped almost eight months, from October 1988 to May 1989. What caused the slip?

Answer. The slip was caused by two major events. The first involved a failure of the payload fairing during qualification testing. The fairing was redesigned and successfully retested. This caused about a 4½ month slip. At this point the vehicle was ready to process for launch. However, do to a processing bottleneck involving the Inertial Upper Stage, the Department of Defense decided to delay the first Titan IV until after shuttle mission STS–30 carrying the Magellan mission to Venus. STS–30 was launched on 5 May. Subsequently, final preparations then began for the first Titan IV launch.

Question. The Committee is advised that the Titan IV FSD contract is estimated to have a $140 million overrun, and the Air Force will assume 90 percent of any overruns above the target cost, even though it is a fixed-price contract. What does it mean to have a fixed-price contract, when the Government is still liable for such large overruns? Given these overruns, is the Air Force satisfied with the performance of the prime contractor on the Titan IV program?

Answer. The actual type of contract for the Titan IV development and production is called a Fixed Price Incentive Firm (FPIF) with Award Fee provisions. The incentive firm feature of the contract means that if the contractor exceeds the target cost of the contract, the Government will pay 90 percent of the overrun and the contractor will pay 10 percent. This sharing of the overrun will continue until the contractor reaches 120 percent of the target cost. At this point, the contractor assumes 100 percent of all overrun costs. FPIF is used when there are risks which cannot be quantified at the time of the signing of the contract. This is to allow the contractor to recover costs for unforseen events. Such events have occurred on this contract (i.e. payload fairing qualification failure).

Overall, the Air Force is satisfied with the performance of the contractor but has identified to them several areas which need improvement. These areas are forward planning, proposal processing, and subcontractor management.

Question. The original contract called for a penalty of $95,000 per day to be imposed on the contractor for every day of schedule slip. According to the current schedule, the total penalty would be around $23 million. Yet the Air Force deleted this penalty provi-

sion when the schedule started to slip. Why? Have the projected cost overrun and schedule slip worsened since that change was made?

Answer. The Air Force deleted the schedule penalty provision because the contractor was making decisions which favored schedule rather than other factors (such as technical) which the Air Force felt were more important over the long run. We substituted the schedule penalty provision with an Award Fee Provision with three Award Fee periods tied to the Initial Launch Capabilities of the three main configurations, Titan IV/Inertial Upper Stage, Titan IV/No Upper Stage and Titan IV/Centaur. The amount available for each period respectively are: $5,527,887, $5,527,887, and $7,370,516.

The overrun has increased in dollar amount since the decision to replace the schedule penalty provision with an Award Fee, but has remained the same on a percentage basis (about 8.8 percent).

Question. The Committee is advised that anticipated profit under this contract is over 10 percent, and that additional profit is available from mission incentives. Is this accurate? Is such a profit rate consistent with the schedule slips and cost overruns experienced in the Titan IV program?

Answer. The scheduled profit on the contract is 11 percent. In addition to this, there are positive incentives for mission success ($7 million), negative incentives for mission failure ($45 million), and Award Fee provisions (see the answer to question 3 for the amounts).

The profit rate is contracted before the effort begins and so by definition is consistent with the scheduled slips and overruns experienced. The first award fee period was completed when the Titan IV/IUS ILC was achieved on 12 February 1989. Martin Marietta was only awarded 70 percent of the available Award Fee pool based on their performance.

Question. The Air Force plans to spend $960 million to develop and procure an upgraded solid rocket motor for the Titan IV. This motor will cost $7 million more than the existing system.

It is believed that only a small number of programs need the extra thrust provided by the SRMU. Is that true, and if so, why are we procuring SRMU's for all the Titan IV users?

It is stated that production of the current motor will end in 1991, which is before the SRMU's first flight. What is our fallback position if the upgraded motor runs into serious problems?

The recent problem at the Avtex plant in Front Royal, Virginia highlights the problem of remaining dependent upon a single supplier for critical materials. Will we have dual production sources for the SRMU?

Did Air Force explore the development of higher-energy propellants for the existing solid rocket motor instead of developing an all new-motor?

Answer. While it is true, the SRMU costs more including the amortized costs, it costs about the same without the amortized costs. The reason for developing and producing the SRMU was to increase productivity, reliability and performance. The current solid rocket motor uses old technology with all the inherent difficulties in maintaining suppliers and is very labor intensive to produce.

Additionally, to continue production of this motor would require some design changes to bring it into compliance with current requirements. To maintain two suppliers would be very costly and require almost two of everything in order to maintain and launch the solid rocket motors.

The fallback position is the same as it would be if the existing steel-case motor ran into a serious problem. The problem would be analyzed, the cause determined, solutions studied and finally, a solution would be selected and implemented.

Currently we have no plans for dual production sources for the SRMU.

The SRMU was chosen as a result of an open competition conducted by the prime contractor. The SRMU uses a higher energy propellant than for the existing solid rocket motor. If the steel-case design with higher energy propellant had been chosen, this would have required significant full-scale motor tests, as well as a new case design due to the higher pressures. It would not have been a simple substitution of propellant. The current SRM contractor chose an alternate approach in the competition and lost the SRMU Award.

METEOROLOGICAL SATELLITE PROGRAMS

Question. At the present time, the National Oceanic and Atmospheric Administration (NOAA) and the Department of Defense operate separate satellite systems for meteorological purposes. These systems, named TIROS and DMSP, have nearly identical operational characteristics and are highly common in their parts. These separate systems have operated for almost 25 years now, despite repeated recommendations to converge them into a single program. Recently, both the GAO and the National Academy of Sciences have recommended, once again, that they be converged due to the significant cost savings which would be expected. What specific reasons do you have for not working with NOAA to consolidate TIROS and DMSP into a single program?

Answer. Since 1972, the DoD and NOAA have spent hundreds of man-years studying and implementing methods to avoid duplication in their respective polar orbiting environmental satellite programs. As a result of this extensive work, the two programs use a common spacecraft bus, use the same launch vehicle, split ground data processing duties, provide complementary environmental data to the Nation, and work very closely on research/development efforts. Attempts to produce further convergence between the two systems run into difficulty due to differing mission requirements and policy issues.

Specific requirements levied on the civil system which are not within the mission of DoD include the collection of afternoon environmental information specifically tailored for the civil numerical weather models; special sensor imagery for agricultural, forestry and fishery applications; search-and-rescue support; data relay; international cooperative programs for basic and applied research; and direct imagery transmissions to other nations. Concurrently, DoD requirements having no analogs in the civil system are data encryption, survivability, launch responsiveness, flexibility in orbit

selection, low-light imagery, and constant-resolution cloud imagery for tactical terminal readout. While it appears technically feasible to design and build a substantially more converged system to meet all these differing requirements, it does not necessarily follow that such a system would be less expensive than the current arrangement.

In addition to these mission differences, there exist a number of key civil and national defense policy differences which necessitate and continue to support separage but closely coordinated programs. As stated in Secretary of State Kissinger's December 10, 1973 letter on the civil program, we should (1) sustain our policy of open access to weather data, (2) meet our established commitments to international organizations, (3) encourage further international participation in our programs, and (4) maintain the civilian character and control of the U.S. weather program as it relates to such international activities. On the other hand, Secretary of Defense Brown's June 4, 1979 letter and Under Secretary of Defense (Acquisition) Godwin's November 6, 1986 response to the GAO report clearly state that due to the importance of DMSP to national security missions, further convergence is only viable by augmentation of DMSP to support civil needs while retaining DoD management. The differences between these civil policy considerations and national security concerns in the context of a fully converage system have always resulted in executive office decisions to maintain two separate systems. Without resolution of these key policy differences, further technical convergence studies appear wasteful.

Question. Is this primarily a case of each agency wanting to protect its own turf?

Answer. No. As described fully in the answer to the previous question, the two programs have worked very closely to minimize duplication and to supplement each other's data requirements. Differences in policy and mission requirements prevent further convergence.

Question. According to the GAO, who reviewed relevant studies, between $250 million and $700 million (in Fiscal Year 1986 dollars) could be saved through convergence. What is the Air Force's estimate?

Answer. The Air Force participated in the 1979 studies which produced the potential savings to which the GAO refers. It is important to note that despite these projected savings, the fundamental mission differences and policy considerations were determined to be more important and the studies resulted in a presidential decision (NSDD 42, 4 July 1982) to continue separate, distinct, but closely-coordinated programs.

In order to update the savings estimate, we would have to review the program today in light of convergence activities since 1979 and in terms of future plans. An accurate estimate could only be done in conjunction with the DMSP Block 6 studies currently underway. But, taking into consideration the cost of developing a system which meets all policy concerns and does not degrade current civil or military capabilities, it is difficult to see where any cost savings could be produced with further convergence. In fact, imposing the military requirements (e.g. survivability, communications security)

to the civil portions of the mission may actually increase overall costs.

Question. In an era of tight budgets, aren't such cost savings attractive to the Air Force?

Answer. Cost savings have always been attractive to the Air Force. Since 1972 we have worked closely with the civil polar orbiting environmental satellite program to reduce costs for both programs wherever possible. We will continue to work together to avoid duplication and to ensure both programs remain cost-effective in meeting their specific mission requirements.

HYBRID PROPULSION SYSTEMS FOR EXPENDABLE LAUNCH VEHICLES

Question. Mr. Welch, current technology in expendable launch vehicle propulsion generally calls for liquid "core" rocket motors with additional solid rocket motors "strapped on" for extra thrust. However, some have proposed research and development of propulsion systems which would combine the best features of liquid and solid motors into a "hybrid" propulsion system. It is stated that hybrid systems would be much cheaper and simpler than today's technology and be more environmentally "clean." What work is the Air Force doing in the area of hybrid propulsion systems for ELVs?

Answer. It is true that hybrid propulsion offers the promise of combining benefits from both solid and liquid rocket propulsion technology. Hybrid technology should combine some of the performance, safety and flexibility of liquid systems with the packaging density of solid rockets. This combination comes at the expense of increased complexity and cost compared with solid motors and decreased fuel efficiency (specific impulse) compared with liquid engines. "Clean" exhaust is not unique to hybrids: today's liquid hydrogen/liquid oxygen engines provide the cleanest exhaust and recent advances in solid propellants have provided clean alternatives for solid motors.

The Air Force currently has no work in progress for hybrid propulsion application to expendable launch vehicles (ELVs). The propulsion portion of the ALS focused technology program is investing predominantly in low cost liquid rocket engine technology with some effort also in clean solid rocket motors. This is because the design studies to date have shown the greatest benefit in cost, reliability and responsiveness with this approach and because the relative maturity of these technologies gives greater assurance of their readiness to support development of advanced launch systems with initial launch capability in the late 1990s.

Question. Is this part of the Advanced Launch System (ALS) program, or are there plans to include it in that program? If not, why not?

Answer. Hybrid technology is not languishing. NASA has planned a substantial investment in hybrids as part of its Civil Space Technology initiative. We will monitor the progress of that hybrid booster technology development and incorporate it as appropriate in our plans for ALSs.

C–17 PROBLEMS

Question. Potential C–17 development problems are surfacing. This is disturbing since C–17 was held back from production a few years ago to allow the C–5B program to go ahead, allowing "extra" time in R&D. The FY 90 budget requests $915 million for R&D alone.

Your "Selected Acquisition Report (SAR)" to Congress dated December 31, 1988, shows the target cost of the C–17 development contract to be $4.2 billion. Yet the contractor estimates the final cost at $4.7 billion and the Air Force program manager estimates over $4.8 billion. What is the problem?

Answer. The DOD projected RDT&E prime contract of $4.848 billion compares to a target price of $4.244 billion. This projected overtarget value covers the contractor's reported estimate at completion (EAC) of $4.687 billion. The current contract with Douglas Aircraft Company (DAC) is a fixed-price incentive (FPI) type in which the Government shares cost risk with the prime contractor—DAC 20%, Government 80%. Thus, the DOD estimate of $4.848 billion overtarget condition.

Question. How much additional RDT&E funds did the Air Force budget this year in FY 90 and beyond that was not contained in last year's five year estimate?

Answer.

	1989/P	1990	1991	1992	1993	1994	Total
December 1988 SAR	$3,297	$955	$504	$462	$129	$14	$5,361
December 1987 SAR	3,353	655	329	174	285	152	4,948
Delta	−56	+300	+175	+288	−156	−136	+413

Question. Explain the flight control system problem? Why is such a fundamental subsystem experiencing problems at this late date?

Answer. The electronic flight control system (EFCS) has been experiecing problems in hardware and software development. On the hardware, Honeywell, the EFCS subcontractor, has experienced difficulty in the design and fabrication of the flight control circuit boards. This primarily resulted from a decision in 1987 to change from a mechanical to a completely digital, fly-by-wire flight control system. This design change also increased the scope of the software required for the EFCS. McDonnell Douglas and Honeywell have signed a memorandum of understanding that outlines specific schedules to support hardware and software development/integration. However, the Aug 90 first flight is at risk up to three to four months.

Question. Will the first C–17 meet the program weight goal?

Answer. The C–17 contract requires that all aircraft meet performance requirements. However, weight is not a requirement. The contractor has the responsibility to design the aircraft to meet performance requirements. The first production aircraft is one of the four production aircraft that will be used in the flight test program. To facilitate testing, the first aircraft will include approximately 6,000 pounds of test equipment and instrumentation. Also, the first aircraft will not include all of the weight savings but is

scheduled for an update after completion of the flight test phase. For these reasons, the fifth production aircraft has been designated as the configuration baseline unit.

Question. Will the August, 1990 first flight be achieved?

Answer. Progress on assembly of the first aircraft (T–1) is about three to four months behind schedule due to late tooling and parts manufacture and avionics subcontractor performance. Therefore, the first flight date is at risk depending upon how much of the three to four months can be made up.

Question. Is the C–17 program currently meeting schedule?

Answer. Due to three- to four-month slip in assembly and some schedule problems with avionics integration, first flight may be delayed. However, the October 1991 delivery of the first operational aircraft and the initial operational capability date (September 1992) should be achieved on time. Subcontractor schedules are considered in the risk assessment for first flight.

Question. For the record, compare the C–17 RDT&E contract values in each Fiscal Year 1988 to 1994 to the budget. Use the contract value at target that existed on March 15, 1989 and show any anticipated ECO changes separately. Explain the difference between the contract and budget in detail.

Answer. The C–17 $5.361 billion budget is comprised of $4.848 billion of Douglas Aircraft Company contractor furnished equipment (CFE) which includes $604 million of anticipated overtarget allowance and other government costs (OGO) of $513 million (includes $106 million of ECO). The budgeted ECO represents 2% of the total full-scale development budget which is well below the normal 10% budgeted for most programs. This is primarily due to low technological risk. The budget values are as follows:

[Then year dollars in millions]

	Fiscal year—						
	1989/P	1990	1991	1992	1993	1994	Total
Target	3,153	547	351	189	4	.....	4,244
Overtarget	.....	253	66	202	83	.....	604
CFE	3,153	800	417	391	87	.....	4,848
OGO	144	155	87	71	42	14	513
Total SAR	3,297	955	504	462	129	14	5,361

ADVANCED TACTICAL FIGHTER (ATF)

Question. The Air Force is requesting $1.1 billion for ATF R&D in fiscal year 1990. How will FY 1990 funds be used?

Answer:

Fiscal Year 1990 Obligation plan

[Then year dollars in millions]

Airframe Primes:	
Northrop	$358.0
Lockheed	358.0
Engine Primes:	
General Electric	166.0

Pratt & Whitney	166.0
Government Test:	
Edwards AFB	15.0
Arnold Engrg Dev Center	14.4
P.O.L.	3.0
Armament	12.9
Small Bus Innov Res (SBIR)	13.2
Mission Support	5.0
Total	1,111.5

Question. A March 1989 press report states: "The ATF weight problem is so severe that General Robert D. Russ, Commander of Tactical Air Command, ordered a major study in early December looking at a fundamental redesign of the plane. Among the drastic options Russ is exploring: making the ATF a single-engine instead of twin-engine plane."

Describe the apparent ATF weight problem.

What is the official ATF weight goal?

What is the current estimate?

Answer. As the Demonstration/Validation (Dem/Val) program proceeds, various design options are explored and potential FSD configurations established. Each year, these potential configurations are reviewed by the USAF leadership and adjustments in the design and/or requirements are made to balance the conflicting demands of a combat effective aircraft and the cost and weight goals. This process has been followed throughout the Dem/Val program and will continue until the start of FSD. This past year, a complete review of not only the ATF, but possible variants of the F–15, F–16, and a new conceptual design were made. The conclusion of that review was that no option other than the ATF could come close to the capability required for the 1990's. Adjustments in both the original requirements and the designs have resulted in reductions of weight since the start of the program. The goal of 50,000 pounds has remained constant throughout the program to establish the discipline to both avoid excessive requirements and proper design emphasis on weight control. Current estimates put both designs in the 50,000 to 55,000 pound weight category.

Question. The Electronics Industry Association recently stated: "ATF avionics bogeys of $14 million (or 40%) of aircraft cost are unrealistically low . . . the problem is overblown requirements and use of technologies like VHSIC to increase functionality rather than to drive down costs . . . there will be 10 to 15 million lines of software code on each ATF, 3 to 4 times the volume on the B–1B and F–15E." How will you eliminate "gold-plated" requirements? How will you achieve your $35 million unit cost goal? How will you manage software, an area that became an unsolvable problem on the B–1?

Answer. As noted in the previous question, the USAF conducts an annual review of all requirements including avionics. This review balances benefits of additional warfighting capabilities with cost and technical risk. The USAF, through this annual review, has been extremely diligent in eliminating "gold plating" and only specifying the necessary capability to deter and, if necessary, defeat the threat. The $35 million cost goal is a real one and remains a significant challenge. The advanced technologies, such as VHSIC, being explored in the Dem/Val program, offer the opportunity to

achieve this needed capability as a price the USAF can afford. The development of the software for the ATF is recognized by the USAF as a vital part of the program. A significant portion of the Dem/Val program is directed at developing the proper tools for the management and coding of the software. Demonstrations are being conducted during the Dem/Val phase of the program to identify and correct any potential problems prior to the start of FSD. The USAF believes this unprecedented up front emphasis on sound and proper software engineering practices will mitigate potential ATF problems.

Question. For the record, compare the ATF RDT&E contract values in each fiscal year 1988 to 1991 to the budget. Use the contract values at target that existed on March 15, 1989 and show any anticipated ECO changes separately. Explain the difference between the contract and budget in detail.

Answer.

CONTRACT STATUS AS OF 15 MARCH 1989 (DEM/VAL FUNDING ONLY)

	Fiscal year—			
	1988	1989	1990	1991
Current contracts:				
Airframe contract:				
(Northrop)	$68.5	$137.5	$358.0	$76.5
(Lockheed)	68.5	137.5	358.0	76.5
Engine contract:				
(General Electric)	166.3	175.8	6.5	13.2
(Pratt & Whitney)	166.3	175.8	7.3	13.2
DEM/VAL Phase II awards				
Engine contract:				
(General Electric)			159.5	.....
(Pratt & Whitney)			159.7	.....
Total contracts	469.6	626.6	1048.0	179.4
Other Government costs	22.7	58.0	63.5	27.2
Budget (PE 63230F)	492.3	684.6	1,111.5	206.6

JOINT SURVEILLANCE TARGET ATTACK RADAR SYSTEM (JSTARS)

Question. The Air Force is requesting $154 million in fiscal year 1990 for continued R&D on JSTARS. Initial production funding is scheduled for fiscal year 1991. What is the status of the JSTARS development program?

Answer. The status of the JSTARS program is that it is now in its fourth year of Full Scale Development (FSD) since contract award in September 1985. During the past two years, two commercial Boeing 707 airliners were modified into JSTARS E-8 aircraft. In July 1987, the first Boeing modified E-8A arrived at Grumman's facility in Melbourne, FL, and flew its first test flight in April 1988. Throughout the remainder of CY 88, the first test aircraft was further modified with the installation, integration and checkout of the prime mission equipment. The first full-up radar flight was on December 22, 1988. The contractor is currently developing and testing the associated system software for integrated radar flight testing and performance validation efforts throughout FY

1989 and 1990. The second JSTARS test aircraft was delivered to Grumman in November 1988 following the Air Worthiness Testing at the Boeing Military Airplane Co. in Wichita, KS. Currently negotiations are ongoing to procure the third JSTARS test aircraft as authorized by Congress and OSD in FY 1988. In early FY 1991, the contractor FSD will be completed and Government Development Test/Initial Operational Test and Evaluation (DT/IOT&E) will begin. The first production of the E–8 aircraft is planned to begin in FY 1982 following completion of Government testing.

Question. What have been the major problems?

Answer. Two areas of concern, the challenge of software development and radar system design, were recognized early in the program. No major technical problems have developed in either of these areas since the April 1988 Defense Acquisition Board (DAB) IIB decision and both are on track with the new DAB IIB schedule.

Question. How much has the program slipped from original estimates?

Answer. The Joint STARS overall schedule slipped about one year, from the 1985 estimate, and a restructured schedule was supported at the DAB IIB review. This slip affected two major milestones:

(1) Long lead production decision from FY 1990 and FY 1991.

(2) The Government Development Test/Initial Operational Test and Evaluation (DT/IOT&E) slipped from early FY 1990 to early FY 1991.

Question. JSTARS is based on a three aircraft test schedule. The first aircraft is available and being used for testing. When will the next two aircraft be available?

Answer. Aircraft number two is currently being modified by Grumman and will be available for radar testing in September 1989. The third aircraft availability is being analyzed. Proposals are expected in May 1989 from various contractors to modify the third aircraft, then its availability will be determined.

Question. Is the current test schedule realistic, given the delivery date of the second and third test aircraft?

Answer. The contractor should be able to meet the system level performance verification requirements within the current program schedule. The Government test schedule is ambitious but achievable.

Question. Will the testing be completed prior to a production decision?

Answer. Yes, we intend to accomplish the required testing prior to a production decision.

Question. The committee is told that the JSTARS development contract will overrun by at least $138 million. What is the problem?

Answer. The Program Office estimates that the contract may overrun by as much as $138 million. The overrun is attributable to problems associated with the radar, data link, and aircraft subcontracts in the early phases of the program. The delay in the company's ability to quickly ramp-up critical engineering skills early in the program, as well as greater than expected complexity in the design and development of the system software, also contributed to the overrun condition.

Question. What is the Government's liability?

Answer. The Government's liability is limited to the ceiling price of the contract. As of January 31, 1989, this value was $707 million.

Question. Won't the contractor attempt to recoup this development loss through higher production prices bid to the Government?

Answer. The contractor is not allowed to "recover" any losses on subsequent work. We do, however, expect his proposals to be conservative, negotiations on price protracted, and contract changes to be difficult. We expect this not only on the production program but on FSD changes as well. Proposal review and cost control is a special emphasis item at the Joint Program Office.

Question. It is reported that the Air Force Systems Command suggested reimbursing the JSTARS contractor at a higher than normal rate for progress payments, but was overruled by the Air Force Comptroller in the Pentagon. Why wasn't the contractor's claim immediately rejected?

Answer. The contractor submitted a request for Unusual Progress Payments to alleviate a cash flow problem detrimental to the overall program's benefit, as allowed by Federal Acquisition Regulation 32.501-2. The request for Unusual Progress Payments was evaluated based on, but not limited to, the following items:

The severity of the projected overrun (30%) which the contractor must fund including interest, and six months delay in program completion, and

The length of time between delivery of major subcontract development effort, and the prime's payment thereof and when the prime has a billable delivery to the Government at the FSD completion in late 1990.

The contractor is now making reasonable progress and the trend in the overrun has stabilized. In this instance, given the required application of loss ratios in overrun contracts, increasing the progress payment rate from 80% to 100% would have merely enabled the contractor to receive an effective rate of 80%—the normal rate.

In summary, the overall contract financing situation was bordering on punitive and considered not in the overall program's benefit. Increasing the normal progress payment rate seemed to best serve the program's interests while adequately protecting the Government's interests for program completion. However, the Air Force Comptroller felt that Grumman Melbourne Systems Division had not exhausted all avenues of private financing since available documentation indicated that the parent company (Grumman) had sufficient resources to provide the desired funding levels. Therefore, the request was rejected.

Question. How will the FY 1990 funds be used?

Answer. FY 1990 funds will be used to continue the Full-Scale Development effort, perform radar flight tests to prove out the full funcitionality of the system, prepare for System Level Performance Verification, and accomplish a short Operational Field Demonstration in Europe.

Question. The main data link for JSTARS is the SCDL (Surveillance and Control Data Link). What cost, schedule, and or performance problems have been encountered in the data link program?

Answer. The Government has experienced no cost increases from Grumman for the basic data link contract. However, Cubic, the data link subcontractor, is overrunning. Cubic had several problems in performing on this contract—a new parts procurement system that did not perform, a lack of test equipment, and fabrication of development hardware before prototype hardware was fully tested. These problems amounted to a 21 month slip in delivery of the first fully functional data links. No performance problems have been encountered to date on delivered units. The units work as they should.

Question. What, if any, alternatives to the SCDL are under consideration?

Answer. Alternative data link sources are being investigated with three additional contractors. In addition, we are studying the feasibility of a common link for this type of data with France and Italy. The contractor proposal is due April 1989.

Question. Has the contractor for SCDL been relieved of any contractual requirements? If so, which ones and why?

Answer. We are considering changes to contract requirements dealing with advance development vice production quality workmanship, some qualification testing but none which affect how the equipment works. Before we agree on these lower requirements, appropriate consideration will be required.

Question. In August 1987, the JSTARS program baseline called for a ten platform program costing about $3.6 billion. In April 1988, the Defense Acquisition Board approved a 22 platform costing about $6.8 billion.

Provide the current program acquisition cost estimate and the life cycle cost estimate for the record.

Answer. The program acquisition cost estimate including RDT&E, Procurement, and Milcon funding is contained in the December 1988. Selected Acquisition Report and the March 1989 Unit Cost Report as follows:

	Billions
RDT&E	$1.8
Procurement	4.9
Milcon	0.1
Total	6.8

The most recent operating and support cost estimate (assuming 22 aircraft force structure, phase-in plus 15 year steady state operation) is $7.2 billion. When combined with the Program Acquisition cost, this yields a total life cycle cost estimate of approximately $14.0 billion.

Question. For the record, compare the JSTARS RDT&E contract values in each fiscal year 1989 to 1991 to the budget. Use the contract values that existed on March 15, 1989 and show any anticipated ECO changes separately.

Explain the difference between the contract and budget in detail.

Answer. A detailed listing of the contract and budget for PE 0604770F is provided below:

(In millions of dollars)

	Fiscal years—		
	1989	1990	1991
Development (Total)	168.0	92.4	26.5
FSD Contract	(64.2)	(35.4)	(6.1)
3rd A/C	(64.5)	(6.6)	(4.0)
Planned ECO Changes	(39.3)	(50.4)	(16.4)
Engr Spt/SPO Ops	37.3	35.5	29.5
Test Support	19.6	20.2	0.8
GFE	4.4	1.2	0.1
IV&V	5.2	4.2	2.0
Total	234.5	153.5	58.9

Note: Planned ECO changes include Processor upgrades, Computer Technical Orders, Test Aircraft Instrumentation, Enhanced JTIDS Exerciser, and Training Aids.

CLOSE AIR SUPPORT

Question. There have been press reports within the last week concerning a new agreement between the Air Force and OSD on the plans for Air Force close air support aircraft.

What is the new agreement concerning A-7s, A-10s, and developing a new variant of the F-16 called "A-16"?

Answer. There is no "new agreement" which has been finalized between the Air Force and OSD on the follow-on close air support (CAS) aircraft. The Air Force submitted an amended President's Budget which contained significant increases in programs related to CAS. The issue will not be resolved until the Defense Resources Board meets during April 1989. It would be inappropriate to discuss the Air Force Amended Budget Submission until the Department of Defense establishes a formal approved position.

Question. How will the $66 million requested in the FY 1990 be used?

Answer. If the $66 million requested in the FY 1990 President's Budget remains budgeted as it currently exists, it would fund the following Research, Development, Test and Evaluation efforts: (dollars in millions) $14 for A-10 upgrade, $5 for DARPA, $3 for CAS studies, $44 for fly-off testing.

Question. Why do you favor developing the A-16 rather than simply upgrading the A-10 fleet?

Answer. It is not a question of "simply upgrading the A-10 fleet." The operational close air support (CAS) and battlefield air interdiction (BAI) requirements defined by the Services and the warfighting commanders cannot be fully met by upgrading the A-10. Reengining the A-10 is not cost effective or mission effective for meeting the requirement. According to Air Force studies, portions of the near term requirement for CAS/BAI (primarily in low intensity conflict) and the longer term requirement for airborne forward air controllers can be met by A-10 avionics upgrades. The driving factor for high intensity CAS/BAI would be better met by a missionized F-16.

Question. What is the total cost for the upgrades to the A-7's and A-10's, and developing and buying A-16's?

Answer. The total costs requested are not available because: (1) a final DoD approved position has not been reached, and (2) the total cost will depend on the approved program schedule.

Question. Why not use AV-8B Harriers, like the Marines do?

Answer. The Air Force has evaluated the AV-8B several times before the current round of close air support (CAS) studies. The Harrier is an excellent CAS and Strike aircraft which employs at speeds similar to the F-16 and meets the specific needs of the Marine Corps. Its vertical/short takeoff and landing (VSTOL) characteristics provide rapid ship-to-shore build up in support of amphibious operations and other limited contingencies. However, these same performance characteristics come at the expense of range and payload capability even when operated from fixed airfields. For the Air Force, this renders the AV-8B less than ideal to support a theater of operations with CAS and/or battlefield air interdiction (BAI). It cannot support cross corps or cross army group tasking (in accordance with the warfighting requirements), and each sortie brings less firepower to the battle. While it clearly meets the Marine Corps' needs, the AV-8B does not meet Air Force needs for Central Region requirements.

Question. Will the Air Force retire A-10's under this plan? What would be the "Average age" of these aircraft? How does this compare to F-4 average age at retirement?

Answer. No formal OSD-Air Force "plan" exists until the issue is resolved within DoD. The current average age of the A-10 fleet is approximately 8.5 years. We cannot establish the average age of the fleet at phase-out since the schedule depends on future, as yet undecided, force structure decisions. If the bulk of the A-10 force remains in service through the mid-1990s, assuming a normal retirement schedule the average age of the A-10 will be approximately 20 years by the year 2000. The overall age of the existing F-4 fleet is approximately 17.5 to 18 years depending on the specific model. The average age of the retiring F-4s varies from 24.3 years for the F-4C to 22 years for the F-4D. It should be noted that retirement of aircraft is based not only on airframe life, but equally on its ability to perform the assigned mission(s) under increasingly demanding threat conditions.

Question. Explain in detail the Air Force's strategy of converting A-10s into OA-10s. Why is an armed A-10 not survivable for close air support, but survivable as a forward air controller?

Answer. The details of the A-10 conversion hinge upon the final follow-on close air support decision yet to be made within DoD. A-10s, enhanced A-10s, and OA-10s will be survivable in future low intensity conflicts, and will be capable of performing traditional CAS and FAC missions. In higher threat scenarios, however, neither is survivable in the classic role of marking targets and delivering ordnance. In these scenarios, the FAC who controls the mission is located in a more appropriate vehicle organic to the Army maneuver unit to which he is attached. Rather than acting in a "close control" or a "target marking" function, the airborne FAC remains removed from the immediate vicinity of the close battle and acts as a rearward airborne coordinator to assist the air-ground operations system in insuring an accurate flow of tasking data and a smooth insertion of CAS assets into the battle.

Question. Explain the fiscal year 1988 to 1991 funding in each fiscal year for the close air support programs as reflected in the current (Reagan) budget, how it would have been used, and what changes are necessary to implement the new CAS agreement.

Answer. The current (Reagan) fiscal year 1990–91 President's Budget does not include FY 1988 CAS funding because the decision was not made until 12 December 1988, after the end of FY 1988. The breakout of CAS programs contained in Presidential Budget Decision 235A3 is as follows:

RDT&E

[In millions of dollars]

	Fiscal years—		
	1989	1990	1991
A–10+	14	14	3
DARPA	2	5	5
Studies	3	3	3
Testing	15	44	44
CAS–X	0	0	0
Procurement	0	0	0
Total	33	66	55

It is inappropriate to discuss changes to the current budget necessary to implement a "new CAS agreement" because a final DoD approved agreement does not yet exist.

TACTICAL SHORT RANGE ATTACK MISSILE (SRAM–T)

Question. The budget request $59 million in FY 1990 and forecasts $115 million in FY 1991 to begin a new start program to develop a variant of the nuclear-capable SRAM missile for tactical use in Europe.

What is the requirement for SRAM–T?

Answer. The SRAM–T fills the requirement for a tactical air-to-surface missile (TASM) that was established by SACEUR's ——— with the TASM to be developed and deployed by ———. The need for TASM (SRAM–T) is based on a deficiency—there are no standoff nuclear weapons for Tactical Air Forces Dual Capable Aircraft (DCA). Serious interest in the need for a tactical air-to-surface weapon began in preparation for the 1983 "Montebello Decision" by NATO's Nuclear Planning Group. The Defense Acquistion Board reviewed candidates to satisfy the TASM requirements and chose the SRAM II, which had the capability of meeting an ——— IOC.

Question. Why is it urgent now?

Answer. SRAM–T is needed in the mid-1990's and beyond as a result of increasingly sophisticated and lethal Warsaw Pact defenses. It is not an urgent "knee-jerk" reaction to the INF treaty. The requirement for a TASM clearly predates the INF treaty, however, the treaty further validates the requirement for an air-launched nuclear standoff weapon. SRAM–T fulfills the NATO's directive to modernize NATO's nuclear weapons. It will hold at risk highly defended, hard and relocatable targets in the Warsaw Pact and Soviet Union.

Question. What is the total R&D cost?

Answer. As of the initial FY 1990/91 President's Budget, R&D for the SRAM-T and for integrating the missile on the F-15E is $281 million (then year dollars).

Question. How many are needed and at what procurement cost?

Answer. The initial programmed buy is for 450 SRAM-T at $339 million. The total number of SRAM-T that will be required for all the theater nuclear commanders is under study by the Joint Staff.

Question. What are the proposed performance characteristics and specifications for the missile?

Answer. The Tactical Air Forces Statement of Need outlines the requirements, which the SRAM II currently appears to meet both goals and requirements:

	Required	Goal
Range	[Deleted]	[Deleted]
Launch altitude	[Deleted]	[Deleted]
F-15E accuracy	[Deleted]	[Deleted]
System reliability	.95	.98
Weight	2100 lbs	1980 lbs
Size length/dia	168"	16"

Question. Why is a variant of Boeing's SRAM missile advocated, rather than adapting other missiles or developing new ones?

Answer. Several candidate missiles were studied by the Air Force to meet the TASM requirement. The final two were the SRAM II and the Navy's Supersonic Low Altitude Target (SLAT) missile. Cost and Operational Effectiveness Analysis (COEA) reports were prepared for both candidates. The SRAM II was determined to be the best candidate because it was already being designed as a nuclear, stand-off missile and it met or exceeded all the TASM requirements and goals except the warhead. A different warhead is desired because NATO's theater-nuclear yield requirements differ from SAC's SRAM II strategic yield. Overall, the SRAM II is the least costly, most timely and lowest risk option to meet the tactical requirement for a stand-off nuclear weapon.

Question. The Army requests funds to develop a nuclear Lance missile program. Why are Follow-on To Lance and SRAM-T both needed? Don't they both do the same job? Which has higher priority from CINCEUR?

Answer. SRAM-T and Follow-on To Lance (FOTL) are of equal priority and are complementary weapon systems. SRAM-T and FOTL can cover some of the same targets, however, they will have different missions. SRAM-T is designed for extending the coverage of NATO dual capable aircraft; allowing them to stand-off and strike heavily defended, hardened and relocatable targets without having to directly overfly these targets. FOTL provides the operational commander with a short range nuclear fire support against high-priority, time-sensitive deep-battle targets in the corps and theater areas of operation. FOTL does not have the range for deep interdiction and there are not enough NATO DCA to support corps level operations. They share an ——— IOC and have an expedited

acquisition schedule. Both are equally important to a theater nuclear modernization program.

Question. What is your acquisition strategy? Is there competition? How concurrent is the program?

Answer. The acquisition plan for SRAM-T is being formulated and has not been formally approved by the Air Force Systems Command. However, the basis for SRAM-T acquisition is for Full Scale Development (FSD) Engineering Change Proposal to the SRAM II contract. Modifications to the SRAM II will be limited to those necessary to meet TAC requirements. Competition was conducted in SRAM II source selection which included Fixed Price Incentive Firm proposals for FSD and options for Lot 1 production. Further competition was fostered at the subsystem level by requiring second sources in the four major subsystems (rocket motor, missile computer, flight control system, and missile guidance), comprising over 60 percent of the air vehicle production costs. The SRAM-T program will benefit indirectly from the experience gained during the SRAM II FSD competition and will benefit directly from the current subsystem dual source strategy. An analysis conducted during SRAM II acquisition strategy planning concluded that competition at the major subsystem level was the preferred competition strategy. SRAM-T production will be concurrent with SRAM II production Lots 2, 3, and 4. A separate production contract will be negotiated in CY 1994. SRAM-T FSC will follow SRAM II FSD by approximately two years, taking full advantage of the SRAM II development and flight test program. The first SRAM-T live launch from an F-15E will follow approximately 20 SRAM II live launches, thereby reducing development risk. Successful completion of the SRAM-T/F-15E flight test program will lead to a Milestone III decision in early CY 1994, allowing SRAM-T production to proceed concurrent with SRAM II Lot 2 production.

TACIT RAINBOW

Question. The Air Force is requesting $21 million for continued development of Tacit Rainbow, the loitering anti-radar missile. What is the status of the development program?

Answer. We started the combined DT&E/IOT&E test phase with the first flight test on March 30, 1989.

Question. How far is it behind schedule?

Answer. We are approximately 19 months behind where we had originally forecast entering DT&E.

Question. When do you plan a production decision, and how does this compare to the original production date?

Answer. Our Milestone IIIA (low rate initial production) decision is scheduled for the fourth quarter of FY 1990; this is approximately 26 months behind the original development estimate schedule.

Question. How concurrent is your program?

Answer. We have a combined DT&E/IOT&E test program, as directed by the Tri-Service Secretaries. Although the Pre-Production Verification (PPV) decision would appear to represent additional concurrency, in that the decision will be made during DT&E/IOT&E (after approximately eight flights), PPV in fact will mitigate some of the schedule risk. The PPV buy allows us to line proof

the production facility at Perry, GA, and maintain the vendor base. The PPV vehicles will be delivered after completion of DT&E/IOT&E, and all PPV assets will be used for ground and flight tests; no PPV missiles will go to the inventory. The decision to enter low rate production will be made after DT&E/IOT&E.

Question. The Air Force recently announced retirement of one fifth of the nation's B-52G conventional bomber force. How does this affect the inventory objective for Tacit Rainbow weapons?

Answer. The programmed retirement of ——— of B-52G dedicated conventional bombers will not affect the Air Force inventory objective for Tacit Rainbow, which is approximately ———. There will still be a sufficient number of B-52G aircraft capable of launching Tacit Rainbow to meet Air Force operational requirements.

Question. For the record, compare Tacit Rainbow RDT&E contract values in each fiscal year 1988 to 1991 to the budget. Use the contract values that existed on March 15, 1989 and show any anticipated ECO changes separately. Explain the difference between the contract and budget in detail.

Answer. A comparison of the RDT&E contract values to the budget follows:

[In millions of dollars]

	Fiscal years—			
	1988	1989	1990	1991
Budget	81.1	39.1	21.0	9.8
Contracts:				
Northrop	36.8	19.4	14.0	6.0
Boeing	21.8	7.3	4.0	0.0

The difference between the budget and contracts funds government test center costs, mission support costs, and minor subsystem development costs.

F-15 INITIATIVE

Question. The budget requests $122 million as a new start for R&D on the F-15E, which is just beginning to be deployed. Please explain the F-15E R&D requirement?

Answer. The F-15 R&D budget request of $124.6 million ($106.2 million in the Amended President's Budget) is not a new start. A separate program element (PE 0207134F) was created this year to simplify allocation of operations and maintenance costs between the F-15A-D (PE 0207130F) and the F-15E. At that time, F-15 R&D funds were moved to the new program element to insure integrated management of all efforts and preclude any possibility of charging twice for the same efforts. This funds ongoing improvements to increase overall combat capability of the F-15 aircraft (including the F-15E) against the evolving threat.

Question. How will these funds be used?

Answer. Funds are for continued flight test and system management, weapons integration of the F-15E, increased performance engine integration on the F-15E, a Very High Speed Integrated

Circuit (VHSIC) central computer to solve memory and throughput limitation on all models of the F-15, radar/electronic counter measure upgrades, and Radio Frequency (RF) compatibility improvements.

Question. What is the total RDT&E cost?

Answer. The total F-15 RDT&E cost is $3,499.5 million. From fiscal year 1990 to 1994 the budget is $327.3 million.

Question. How will this affect future F-15E unit costs?

Answer. Production costs for improvements under development are included in the budget, as reported in the Selected Acquisition Report (SAR). Most of the improvements currently under development are such that they can be implemented with software, and there will be no additional recurring hardware costs.

Question. Is the Statement of Need from the Tactical Air Command complete?

Answer. Yes, the F-15E Statement of Need is complete.

Question. Provide for the record the funding in each fiscal year 1988 to 1994 for each of the discrete elements of the F-15 R&D line along with its total estimated cost?

Answer. The following table consolidates the development efforts under Program Elements 0207130F and 207134F, and provides the requested information (Then Year dollars in millions):

	Fiscal years—							Total
	1988	1989	1990	1991	1992	1993	1994	
Flt Test/Sys Mgmt	34.1	46.4	42.7	30.6	19.9	20.2	18.8	775.4
Weapons Integ			16.5	29.5	8.4	1.4	1.0	56.8
IPE Integr	12.9	8.6	9.5	.7				35.0
VHSIC Computer	10.4	11.1	8.1	6.3	3.9	.6		49.7
Radar/ECCM	3.0	6.6	9.7	10.9	9.2	1.6	1.5	51.7
RF Compatibility	6.4		3.2	7.7	4.6			39.7
Other/Completed	32.4	14.9	16.5	28.3	5.9	5.9	4.2	2491.2
Total	99.2	87.6	106.2	114.0	51.9	29.7	25.5	3499.5

LAND ATTACK MISSILES

Question. The Air Force has a number of tactical land attack missile programs in development, and more planned as FY 1990 new starts. Do you have a plan for tactical air-to-ground missiles?

Answer. Yes, tactical missiles are included in the DOD Standoff Weapons Master Plan, which was submitted to Congress in June 1988, and is currently undergoing its annual update.

Question. Explain the similarities between the Popeye, SLAM, MSOW, and AGM-130 missiles.

Answer. The similarities are primarily superficial in that: the four weapons provide launch from outside point defenses around targets; all are highly accurate, providing pin-point accuracies; and all would be employed against high-value targets. The missiles are dissimilar in availability, cost, warhead size and type, standoff range, day/night capability, mission planning, logistics base, and carrier aircraft capability.

Question. Are these all being pursued?

Answer. Yes, as follows:

Popeye (HAVE NAP): Since successfully completing Foreign Weapons Evaluation on the B–52G in July 1987, HAVE NAP has been Strategic Air Command's (SAC's) highest priority conventional program. With HAVE NAP being declared operational in November 1988 ———.

SLAM: A modified Harpoon, SLAM is being developed by the Navy as a near-term conventional standoff capability. ———.

AGM–130: A rocket boosted version of the GBU–15, AGM–130 is completing development by the USAF. Procurement for employment by F–111s and F–15Es is being evaluated. Significant factors in this evaluation are the AGM–130's large warhead, near-term availability, and use of the existing investment in GBU–15 (i.e., GBU–15 components, carrier aircraft, logistics base, and production line).

MSOW: A multinational effort to produce a low-cost flexible, automonously guided, launch and leave standoff weapon. MSOW is currently in source-selection for its project definition (demonstration/validation) phase. It would, optimistically, be fielded in 1996.

Question. Which has the highest priority?

Answer. Because of their different applications, aircraft compatibilities, purposes, and dates of fielded capability, it is not necessary to prioritize between the systems. However, the current Air Force priority is based on several factors. ———.

Question. The Air Force claimed to have cancelled AGM–130 last year, but R&D testing continues.

Answer. In the budget for 1989, the Air Force deleted all AGM–130 production funds due to development problems. At that time, however, the Air Force still supported testing of the previously purchased weapons (18 AGM–130/TV). If the weapon worked well in the scheduled tests, it would compete for production funds in future Air Force budgets. ———. At the time of submission of the budget for 1990, the AGM–130 had not progressed sufficiently in testing to determine that it had "worked well" ——— AGM–130 testing are currently being reviewed to determined if pursuing AGM–130 production funding is now appropriate.

Question. What are the results of the latest tests?

Answer. Six of nine developmental launches have been successful. Of the nine total, the last five consecutive launches have been direct hits. The missile has been certified as ready to enter initial operational test and evalulation. Operational testing began in April 1989.

Question. What funds are budgeted in FY 1990 and in each year of the FYDP for AGM–130?

Answer. No funds are currently budgeted in FY 1990 or in any year of the FYDP for AGM–130.

Question. Do you plan to submit a reprogramming request to Congress this year to resurrect AGM–130 procurement?

Answer. If the review of ——— AGM–130 testing shows AGM–130 procurement to be appropriate, we will pursue production funding at the earliest available opportunity. In any event, the earliest we would start production would be in FY 1990.

Question. Explain your FY 1990 new start request of $5 million for SLAM. What is your requirement for SLAM?

Answer. The Air Force FY 1990 new start is to ———. With RDT&E funds in FY 1990, the USAF will begin reviewing options to meet this requirement.

Question. How do SLAM and Popeye differ, and on what aircraft would each be used?

Answer. Popeye (HAVE NAP) is operational on the B–52G. ———. HAVE NAP has been operational since November 1988; SLAM's first DT/OT launch has slipped to July 1989. ———.

Question. What is the total cost of the Air Force SLAM program?

Answer. Total USAF funding for SLAM is $15.9 million.

Question. Provide for the record the funding for SLAM in each Fiscal Year 1988 to 1994 by appropriation and line item.

Answer. Air Force funding for SLAM (line item 164) is as follows (USN funding for SLAM is not included) (3600 money only, no planned procurement) (millions):

	Fiscal years—						
	1988	1989	1990	1991	1992	1993	1994
3600			5.1	10.1	0.2	0.2	0.3

Question. Another new start is Air Force MSOW (Modular Standoff Weapon) for which $24.7 million is requested in FY 1990. What is the requirement for Air Force MSOW?

Answer. The Air Force requirement for MSOW is for a low cost, autonomous, standoff weapon for attacking fixed and mobile targets from beyond point defense threat systems. MSOW is not a new start. The program was originally funded under Nunn cooperative funding in FY 1986/87. In FY 1988, Congress moved the Air Force funding line to an OSD Joint Standoff Weapon (JSOW) PE where it remained until resolution of outstanding issues ———. It was moved back to the Air Force in FY 1990.

Question. Provide for the record the same information as requested above for SLAM.

Answer. MSOW funding (line item 138) (millions) is as follows (3600 money only, production begins after FYDP):

	Fiscal years—						
	1988	1989	1990	1991	1992	1993	1994
PE 6470 2D (OSD)	13.3	1.4	0	0	0	0	0
PE 6472 FF (USAF)	0	0	24.7	34.6	84.1	93.7	93.1

ADVANCED MEDIUM RANGE AIR-TO-AIR MISSILE (AMRAAM)

Question. AMRAAM is well into production. The FY 1990 budget requests $15 million to start development of AMRAAM upgrades. What is your requirement for AMRAAM upgrades?

Answer. The primary requirement for AMRAAM upgrades is to maintain the AMRAAM's superiority as a weapon system for U.S. and NATO fighters. The need to integrate the AMRAAM effectively on advanced fighters while maintaining compatibility with existing fighters will necessitate some missile upgrades. Since the incep-

tion of AMRAAM over 10 years ago, the threat has evolved significantly. ———. All pose significant possibilities of reducing the AMRAAM's effectiveness. The proposed improvements will give AMRAAM the capability to meet the threat and defeat it by upgrading a current system and keeping new weapons development costs to a minimum.

Question. What is the total R&D cost for these upgrades?

Answer. The total amount budgeted for the AMRAAM P3I program in the FY 1990 President's budget is $188.7 million.

Question. What specific performance improvements are expected? Which of these is the most urgent?

Answer. Performance improvements are needed to ———. The Tactical Air Command had identified AMRAAM carriage on advanced fighters as their top P3I priority. Following are the P3I projects (in priority order) which have been identified to respond to these threats areas:

1. Compatibility with advanced aircraft such as the Air Force Advanced Tactical Fighter.

2. Use of Electrically Erasable Programmable Read-Only Memory (EEPROM) chips, to provide field-level software reprogramming of the missile thereby reducing logistics costs and allowing greater flexibility in response to threat changes.

3. ——— to include hardware upgrades in the micsile seeker and microprocessor to address threats that are not countered exclusively by software changes.

4. Improved fuze and warhead for use against low radar cross section targets and fuze countermeasures.

Question. How has the Navy participated in defining requirements for such upgrades?

Answer. The Navy has personnel assigned full time in the AMRAAM Joint Systems Program Office (JSPO) and in the P3I project office. Requirements for upgrades are coordinated with the Navy.

Question. For the record provide a table showing the funding for each AMRAAM upgrade in each fiscal year 1988 to 1994.

Answer. Details of the AMRAAM P3I projects and associated funding will be provided through a separate classified briefing.

HYPERVELOCITY MISSILE

Question The Army and Air Force have been jointly developing hypervelocity missiles which could kill tanks by propelling "dumb" metal warheads at very high speeds. What is the status of the Air Force program?

Answer. The hypervelocity missile concept is strongly supported within the Air Force. The program is presently under review because of technical problems discovered during the joint Air Force/Army/Marine Corps, Ground Launch Demonstration phase and airborne fire control uncertainties. The results of this review will determine the best way to proceed with an Air Force Air Launch Demonstration.

Question. There have been problems by the contractor (LTV) in getting the fire control unit to "talk" to the missile. How is this being addressed?

Answer. We are investigating other fire control systems and have accomplished some risk reduction work by demonstrating, during ground launch, improved Forward Looking Infrared (FLIR) tracking. The next phase of the Air Force program will concentrate on the airborne fire control aspects of the system.

Question. What are your plans for competing the design of the hypervelocity with new contractors? Given the design problems and testing difficulties, isn't this premature?

Answer. The Air Force is reviewing program options now—some of these options involve competition. Interest has been expressed by fire control houses, other missile houses and integrators.

Question. How much is budgeted in FY 1990 for hypervelocity missile work and how will it be used?

Answer. There is $8.1 million budgeted in FY 1990 for hypervelocity missile work. This money will be used for airborne fire control work, missile/aircraft/fire control interface design, and missile safety certification for airborne carriage and release.

Provide for the record a breakout of Air Force HVM missile funding in each fiscal year 1988 to 1994.

Fiscal years:	*Amount*
1988	$2,155,000
1989	5,521,000
1990	8,100,000
1991	5,900,000
1992–94	(1)

[1] TBD in FY 1992 POM.

FIGHTER ENGINES

Question. The Air Force has a number of initiatives underway to improve the performance of its fighter aircraft engines.

Could you please summarize the Air Force's fighter engine "roadmap"?

Answer. Our current F–15 and F–16 production plans include continued production of the Alternate Fighter Engines (F100–PW–220 and F110–GE–100) with a phase in of Increased Performance Engines (F100–PW–229 and F110–GE–129) into operation in the FY 1992 time frame. The IPE engines are expected to provide the performance capability required for the remainder of our F–15 production and planned F–16 production through the late 1990s.

We currently are demonstrating the F119–PW–100 and F120–GE–100 engines in the ATF Dem/Val program. This work will result in the demonstration of these engines through flight test in the 1990 time frame. The FSD program for the ATF engine is being planned and is expected to start in 1991. One engine will be selected to go forward into FSD and future production.

Concurrently, we are also preparing for the eventual need to upgrade our propulsion capabilities. The Engine Model Derivative Program is currently conducting various trade studies involving thrust growth, controls and accessories upgrades, low observables improvements, and the introduction of round vectoring nozzles. These efforts are expected to result in engine development activities in the early to mid-1990s to protect options for future F–16 production and potential upgrades to existing F–15s and F–16s.

Question. Explain the growth in the Alternate Fighter Engine line (from $28 million in 1989 to $64 million in FY 1990). For the record, compare the AFE RDT&E contract values in each Fiscal Year 1988 to 1991 to the budget. Use the contract values at target that existed on March 15, 1989 and show any anticipated ECO changes separately. Explain the difference between contract and budget in detail.

Answer. FY 1989 funding requirements have decreased significantly from prior years as the initial Increased Performance Engine (IPE) qualification effort nears completion. The increase in FY 1990 represents the amount required to complete planned Operational Capability Release (OCR) tasks that are essential to maintaining an acceptable level of risk in the IPE program as engines are readied for deployment. These tasks include sea level and altitude testing, production and full life accelerated mission testing, crack growth testing and engine maintenance plan development. Prior experience has clearly demonstrated that failure to complete all of these efforts will significantly increase risk in the IPE production program.

Based on current financial plans, the following breakout represents planned contract values and other budgeted costs for the FY 1988–91 time period. There is nothing included in any year for ECO.

[Then-year dollars in millions]

	Fiscal year—			
	1988	1989	1990	1991
Planned contract values	59.1	18.3	56.6	5.0
Altitude test [1]	7.4	4.2	2.8	.....
Flight test [2]	1.9	2.7	.5	.....
Other Government costs [3]	6.3	1.9	3.9	.....
Total budget	74.7	27.1	63.8	5.0

[1] Primarily Arnold Engineering Development Center.
[2] Air Force Flight Test Center.
[3] Petroleum, oil, and lubricants (POL) and mission/engineering support.

Question. Explain the engine Component Improvement Program for engines already deployed in Air Force aircraft. Why do you need $112 million in FY 1990?

Why do you need growth over the 1989 level ($93 million)?

For the record, provide a table showing the budget for each specific engine in the CIP program in each fiscal year 1988 to 1994.

Answer. CIP provides engineering support and testing to insure that engines continue to safely support current missions of host aircraft, reduce cost of ownership, improve system operational readiness (OR), and keep older engines operational. Historically, aircraft systems change missions, tactics, and environments to meet changing threats. The highest priority of CIP is to address all safety of flight issues. History also shows an active CIP is an effective way to reduce the cost of engine ownership and improve system OR by improving durability, operability, reliability and maintainability (R&M), repairability, and suitability as service time accumulates and operational conditions change. CIP starts

after engine development and the Air Force accepts the first production aircraft with the engine. CIP continues over the engine's life, gradually decreasing to a minimum level sufficient to keep older inventory engines operational. Typically, this low level effort develops depot repair procedures.

This funding is required to provide minimum level of engineering support and testing for 22 engines to maintain flight safety, improve system operational capability, reduce cost of ownership (support costs), keep older engine operational and maintain engine performance. Specifically these funds provide for 11,000 hours of flight and ground test, 530 analysis tasks, 461 tasks to redesign parts, and 131 tasks for repair procedures.

The increased costs in FY 1990 reflect the addition of the two new Increased Performance Engines (IPEs) ($12.4 million) into the already existing pool of CIP engines and the addition of Accelerated Mission Tests ($7.1 million) deferred from previous years due to budget constraints. FY 1990 represents the first year of funding for the IPEs.

FY 1990/91 PB CIP FUNDING BREAKOUT

	Fiscal year—						
	1988	1989	1990	1991	1992	1993	1994
ATFE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
F100	25.647	25.600	22.287	19.632	20.500	14.500	11.500
F100-PW-229 (IPE)	.000	.000	7.312	24.374	32.500	27.463	33.048
F101	12.819	16.000	16.185	14.349	14.576	12.500	12.084
F107	.300	.416	.900	.600	.500	.400	.400
F110	19.228	20.869	25.255	26.777	31.500	25.233	24.195
F110-GE-129 (IPE)	.000	.000	5.061	14.551	22.373	19.500	26.057
F112	.000	.400	.605	.750	.750	.800	1.160
F118	.000	.000	.000	.000	.000	.000	TBD
GTU	.636	1.500	1.536	2.275	1.943	1.600	1.663
J57	.400	.212	.452	.331	.175	.600	.300
J69	.361	.645	.658	.420	.384	.396	.408
J79	.600	.442	.363	.316	.231	.226	.226
J85-215T6	.550	.000	.000	.000	.000	.000	.000
J85-8STG	1.400	.900	1.118	1.196	1.344	1.000	1.439
T56	2.100	1.840	2.604	3.141	3.120	2.300	3.104
T58/T64	.310	.340	.250	.215	.215	.215	.000
T400	.100	.100	.000	.000	.000	.100	.100
T700	.100	.100	.100	.100	.100	.100	.100
TF30	7.600	6.000	6.163	6.140	6.675	5.114	6.170
TF33	1.000	1.315	1.159	1.445	1.425	1.500	1.675
TF34	4.900	4.200	4.898	4.475	4.500	4.000	4.000
TF39	4.509	3.810	4.689	5.155	5.480	4.140	4.710
TF41	2.950	2.571	3.065	3.258	3.493	2.700	2.515
TFE731	1.000	.000	.000	.000	.000	.000	.000
WR361	.000	.000	.000	TBD	TBD	TBD	TBD
POL	3.655	6.500	7.034	7.030	8.056	7.943	8.136
MISSION SUPT	.700	.750	.800	.800	.800	.800	.850
TOTAL	90.86	94.510	112.494	137.330	160.640	133.130	143.840

Note 1. FY 1993/94 dollars reflect 1990/91 PB; however, they are incorrect and will be revised during the next POM to reflect $165 million/$160 million respectively.
Note 2. TBD indicates planned incorporation of the particular engine into CIP. Funding is as yet undetermined.

Question. Congress denied the Air Force request for less than $1 million in the Engine Model Derivative Program. Explain why your current R-1 document shows these funds have been restored?

When will the prior approval reprogramming request be sent to Congress for this item which was specifically denied? Explain why such work cannot be done under CIP.

Answer. FY 1989 EMDP funding was zeroed by the HAC. However, the SAC recommended funding EMDP at $.557 million. The Appropriations Conference agreed with the Authorization Conference and funded EMDP at $.957 million.

Historically, the Aircraft Engine Component Improvement Program (CIP) funded the development of improved performance derivative engines. Most engines that passed their 150-hour Model Qualification Test (MQT) prior to 1968 evolved through several improved performance "dash" versions. For example, the J79 turbojet used in the F-104, B-58, and F-4 aircraft realized a 21% thrust increase from the original J79-GE-3 model to the ultimate J79-GE-17 model. The J85, TF30, and TF33 engines had thrust improvements of 32%, 36%, and 27% respectively.

But in 1968 Congress imposed a major change in the CIP program. Some members of Congress perceived abuse of CIP, charging that engine contractors were preparing for the next generation new engine competition under CIP rather than under IR&D or other programs. Accordingly, Congress prohibited the use of CIP funding for programs seeking higher thrust engine performance. CIP was restricted to solving safety of flight problems, correcting service revealed deficiencies, and improving durability, reliability, maintainability, etc. The service lost the ability to improve the thrust performance of existing engines.

During the ten year period from 1968 to 1979, four turbofan engines passed their MQTs and began operational service in Air Force fixed wing aircraft. These were the TF34, TF39, TF41, and F100 engines used in the A-10, C-5, A-7, and F-15/16 aircraft respectively. Despite significant advances made in engine technology since their introduction, the first three engines have never been modified to give improved performance. Work on improved performance versions of the F100 began in 1979 with the establishment of the Engine Model Derivative Program (EMDP).

EMDP restored the capability to take advantage of advances in engine technology and demonstrate improved thrust performance derivative engines. The difference in objectives of the CIP and EMDP programs have properly driven the efforts to separate Program Elements. CIP and EMDP now compete individually for funding against a broad field of R&D efforts. This management approach avoids constant sacrificing of field supportability to performance growth development as when both objectives were funded within a single Program Element.

JOINT INTEGRATED AVIONICS WORKING GROUP

Question. Many Congressional Committees have expresed the desire for future DOD aircraft systems (Army LHX, Navy ATA, AF ATF, and all variants) to have highly common avionics.

What have been the accomplishments of the DOD's Joint Integrated Avionics Working Group during the last year?

Answer. The Joint Integrated Avionics Working Group (JIAWG) has been chartered to develop specifications and standards to

define common avionics for the Air Force Advanced Tactical Fighter (ATF), Navy A-12, and Army Light Helicopter (LHX). The full range of avionics is being evaluated for feasibility and payoffs of standardized hardware and software. JIAWG strategy is to standardize avionics at a common module level. This allows the tailoring of an avionics suite based on the platform's mission while achieving economic and logistical advantages of JIAWG compliant common modular avionics. Areas JIAWG is concentrating on include, core processing for target and threat detection sensors, communication, navigation, identification (CNI), countermeasures to defeat hostile systems, and digital signal data processing. JIAWG has made good strides in all areas related to achieving common modular avionics. Specifically, JIAWG accomplishments in the past year are:

(a) Delivered the Joint Integrated Avionics Plan (JIAP) with Triservice signature to the DOD focal point for common avionics.

(b) Delivered Common Avionics Baseline (CAB) IIA&B specifications. CAB specifications and standards are an evolving series of progressively more complete and mature documents. CAB II documents are the initial set of core avionics documents along with commonality assessments for avionics functional areas.

(c) Adjusted key milestones of the participating aircraft to coincide with CAB document release. CAB III documents (FSD specifications) are due December 1989, in time for ATF/LHX FSD request for proposals. Additionally, the critical design review (CDR) for the ATF and LHX have been aligned and coincide with CAB IV (CDT specifications) release.

This entails packaging the common modules into an integrated function, developing aircraft unique interface modules, and development of sensor apertures for non-low observable aircraft. FY 1990 will begin the study efforts to develop the necessary interface requirements.

d. $3.4 million is requested for design engineering work to integrate INEWS and ICNIA for the ATF.

FY 1989-94 BREAKOUT—INTEGRATED EW/CNI DEVELOPMENT LINE (PE 0604250)

[Dollars in millions]

	Fiscal year—						
	1988	1989	1990 [1]	1991	1992	1993	1994
INEWS	$7.7	$71.4	$79.9	([2])	([2])	([2])	([2])
ICNIA	0.0	37.9	3.0	([2])	([2])	([2])	([2])
Integrated COMSEC	0.4	11.6	18.3	$6.3	$1.3	$0.4	0.0
Seek Spartan	0.0	.4	5.0	38.1	42.8	41.5	$50.9

[1] In FY 1989 the Air Force received a $34.7 million additional appropriation to accelerate the development of common integrated avionics. This additional funding is being used to "Repartition" ICNIA modules for compliance with JIAWG standards, Air Force Advanced Tactical Aircraft avionics update study, ICNIA flight test demonstration, JIAWG specification development, and COMSEC module development.
[2] Funded in ATF line.

Question. How do Integrated Communications, Navigation, and Identification, Avionics (ICNIA) and Integrated Electronic Warfare System (INEWS) fit into the JIAWG process.

Answer. JIAWG specifications and standards define an Advanced Avionics Architecture (A3) which will be incorporated into the AF, LHX, and A-12. The advanced architecture is designed to integrate

avionics functions in a hierarchical structure with a common data bus, centralized processing, and common module avionics. INEWS/ICNIA are technologies which feed into the advanced avionics architecture. During the ATF demonstration/validation program, the ATF prime contractors will integrate advanced development modules for both INEWS and ICNIA into the respective contractors avionics test bed.

INEWS/ICNIA as well as other technology base programs are key elements of the JIAWG common avionics strategy. However, the actual configuration of these avionics systems and of JIAWG common module avionics baseline will be established during weapon system full scale development and used where cost-effective.

(d) Initiated a Joint Management Issues Team to identify issues, coordinate with industry, and oversee needed activities. This team pulls together critical issues as the JIAWG process evolves. One such issue is industry participation in JIAWG. Industry is critical to the success of JIAWG common module avionics. In recognition of this fact, JIAWG has a signed industry memorandum of agreement along with industry executive council and advisory group.

In addition to the above tasks completed in the past year, JIAWG was involved in many new initiatives. These initiatives include advanced simulation for the new generation of gate array integrated circuits, improvement to avionics life cycle cost models which take into account the entire force structure, and modular communication security (COMSEC) units for encryption/decryption of data.

Question. What is the status of these programs? Provide for the record the R&D funding in each fiscal year 1988 to 1994 for ICNIA and also for INEWS. Compare this to the contract values at target as of March 15, 1989 and describe the difference between the budget and contract requirement. Also indicate the contractor and program manager estimates at completion of these contracts.

Answer. The following is the requested funding program for the ICNIA and INEWS Budget Program Activity Codes. These efforts are supported by multi-service program elements. The two program elements for INEWS/ICNIA in the Air Force are PE 63109 and PE 64250.

[Dollars in millions]

Program Element	Fiscal year—					
	1988	1989	1990	1991	1992	1993
63109F:						
ICNIA	$15.4	$4.1	$3.4	$8.2	0.0	0.0
INEWS	36.5	1.1	1.5	3.5	0.0	0.0
64250F:						
ICNIA	0.0	36.1	3.0	(1)	(1)	(1)
INEWS	7.0	73.1	79.9	(1)	(1)	(1)

[1] Funded as part of ATF line.

Current estimate at completion of the ICNIA contract is $108 million. The Air Force budget supports this contract to completion. INEWS consists of two fixed price contracts totaling $236.8 million.

In addition to the basic ICNIA contract, the ICNIA program activity code includes Integrated Electromagnetic System Simulator, High Frequency power amplifier for Army applications, mission support, and analysis for technology development. Additionally, these funds include independent analysis and testing efforts.

Question. Your budget requests $106 million for "integrated EW/CNI development". Explain the goals of this program.

How do INEWS/ICNIA fit in?

What work beyond these programs is contemplated and why?

Provide for the record a detailed breakout of this line in each fiscal year 1988 to 1994.

Answer. The budget request for $106 million breaks down into the following programs:

a. $79.9 million is requested for continuation of the Integrated Electronic Warfare System advanced development models (ADMs) which will be integrated into ATF avionics test beds. In the past year, the Air Force did a major restructure of the INEWS program to accelerate the transition of INEWS technology to meet the ATF schedule. The program restructure extended and aligned the INEWS program to coincide with ATF demonstration validation work. This allows both Joint Venture INEWS teams to build ADM hardware and software to support ATF prime contractors preferred system concept. The first set of ADMs are scheduled to be integrated into the test beds later this year. For the near term, INEWS efforts focus on the ATF, with continued work on definition of defensive avionics requirements for the ATA.

b. $18.3 million is requested for continued development of a common module Advanced Avionics Communication Security (COMSEC) Unit. The Advanced Avionics COMSEC unit program, managed by the National Security Agency with Air Force funding is underway and well along in design. The program is fully coordinated with the ATF, A-12, and LHX programs. The result of this program is a series of deliverables which will be made available to aircraft contractors for in-house evaluation.

c. $5.0 million is requested for the transition of INEWS technology based JIAWG compliant common module avionics to aircraft other than ATF (This project is called SEEK SPARTAN). In order to take advantage of economies of scale production, reduce the proliferation of new electronic warfare functions, and create a common logistical infrastructure, JIAWG common module avionics will have to be incorporated into non-JIAWG aircraft.

COMBAT EDGE

Question. The Congress provided specific direction last year to accelerate the development of advanced life support equipment for Air Force pilots—in a program called "Combat Edge"—which is aimed at preventing "blackouts" and "greyouts" of pilots in high performance jet aircraft. What is the status of the development program?

Answer. Combat Edge full scale development went on letter contract to Boeing Advanced Systems, Seattle, Washington, on March 17, 1989. Full scale development entails a 17 month period of per-

formance. The Air Force had planned to be on contract in December 1988, but Boeing did not submit their proposal until then.

Up to this time, Combat Edge development proceeded under a contract modification to the Tactical Life Support System contract using $3.0 million of FY 1988 funds from the life support program. This effort has resulted in the design of the manmounted equipment, including level II engineering drawings, that will undergo a critical design review in April 1989. We have also produced prototype equipment that was used by TAC pilots in the centrifuge to verify the design as well as to get an early scoping of logistics and test planning for Combat Edge.

Question. How high a priority is this to the Tactical Air Command?

Answer. Combat Edge as a project, and life support as a program, are not currently ranked on the TAC Research, Development and Acquisition priority list. However, TAC has stated that Combat Edge is their highest life support priority. The TAC commander had wholeheartedly endorsed fielding Combat Edge at the earliest possible time.

Question. How have you implemented Congressional direction to realign the necessary funds in various aircraft programs (like F-16 and F-15) to implement the Combat Edge acquisition strategy and to field this critical capability at the earliest possible date?

Answer. We realigned resources from within the life support program element to fund full scale development of Combat Edge. We are also working with TAC to identify sources within aircraft modification programs and will advise you when these sources are identified.

Question. When was Combat Edge originally requested by TAC to be fielded?

Answer. In May 1988, TAC requested Combat Edge be fielded in 24 months, leading to a first unit equipped date of April 1990, even though the program office advised TAC that there was only a 20 percent chance of meeting the April 1990 date.

Question. Under your current budget, when will Combat Edge actually be fielded?

Answer. Our current budget still needs to be amended to include some aircraft modification and stock fund adjustments. We have revised our first unit equipped date from April 1990 to August 1990, based upon a 17 month period of performance for full scale development.

A-7 STRIKEFIGHTER

Question. Congress has been keenly interested in upgrading the A-7s for the Reserve Forces. The program is supposedly a high priority to the Tactical Air Command as well. What is that status of the A-7 Strikefighter development program?

Answer. The Air Force intends to fully fund the prototype program. This will provide flight test evaluation of the two prototypes and provide a basis for a production decision.

Question. Is it on schedule?

Answer. The YA-7F prototype contract called for a first flight in May 1989. Due to program delays, the expected first flight is 8-10

weeks behind schedule. The contractor, LTV, is evaluating changes that would achieve a first flight in July. However, the Program Office estimates that first flight may not occur earlier than September 1989, and the Air Force is assessing the contractor's efforts.

Question. The Appropriations Committees directed the Air Force to budget procurement funds in a separate line item for the A–7, should the development program be successful. Why are there none in your current budget or five-year plan?

If A–7 development is successful, where will you get the funds for the A–7 Strikefighters?

How many Strikefighters are required, and at what total cost?

How do the A–7 Strikefighter and F–16 multiyear programs relate as far as funding is concerned?

Answer. The Air Force and DoD believe that the prudent approach to the A–7F program is to fully fund the prototype development and evaluation. Procurement funding will be sought if a production decision is made. At present, because the prototypes have not flown, it is difficult to make a firm production decision and allocate valuable TOA. Once the prototypes fly, validate performance requirements, and fiscal realities are assessed, the Air Force will again consider procurement. If at that time, it is in our best interests to procure the A–7F, funding will be sought.

If a favorable decision is made, a portion of the overall close air support (CAS) funds in the budget could be redirected to support the initiation of the procurement program and Air Force plans will have to accommodate the balance of the costs.

If a favorable decision is made, the Air Force proposes to modify 337 A–7 aircraft to A–7F configuration at an estimated total program cost of $4.3 billion.

If a production decision is made on the A–7F, the requirement for 337 aircraft would remain firm. Air Force plans to procure the A–16 do not involve a "delta" to the planned F–16 buy. A–16 procurement would be accomplished within the total planned budget for the F–16 Program. If the A–7F is not procured, then more A–16 configured aircraft may be purchased within the F–16 multiyear contract (MYP III). Therefore, the A–7F procurement only impacts the configuration of the aircraft purchased in MYP III, not total airframes.

Question. GAO recently raised the following concerns:

Specific operational performance requirements for the A–7 have not been identified although we are building prototypes;

Upgraded A–7's capabilities have not been assessed against the latest close air support scenario;

Avionics engine options are undecided, which affect ultimate program costs; and

The prototypes' delivery date has slipped two years.

How did the Air Force respond to these concerns?

How do resolution of these issues affect the pace of the A–7 development program?

Answer. The YA–7F contract specifically requires significant performance improvements over the A–7. The improvements involve acceleration, sustained load factor, take-off roll, landing roll, and maximum speed at sea level. The Statement of Operation Need (SON) No. 503–46, dated February 19, 1987, also defines A–7F oper-

ational requirements. The Air Force conducted two studies to assess A-7F mission effectiveness compared to the mission effectiveness of other candidate aircraft. Both studies evaluated the aircraft's performance in the high-threat environment of Europe, and the A-7F was determined to be as capable and, in some cases, more capable than other candidate aircraft. In 1986, the Tactical Air Command (TAC) evaluated the CAS and battlefield air interdiction (BAI) mission capability of the A-F, the F-16C, and the A-10 aircraft to identify their combat and target kill potential. In 1987, a study by Air Force Studies and Analyses evaluated the mission effectiveness of the A-7F the A-7, the A-10, the A-10 with new engines, the F-16, and a modified F-16. In April 1987, the Army provided the Air Force with statements of tactical air support requirements for the 1990s. The requirements are related to specific battlefield characteristics and are the most detailed requirements developed to date. They are a part of the Air Force mission requirements package (MRP) approved by the DoD in December 1987. The MRP is a comprehensive data base of aircraft design, mission requirements, and operational capabilities. It was derived for an Air Force study known as CASADA or Close Air Support Aircraft Design Alternatives. It specifies three scenarios and nine operational missions in high- and low-threat environments. Recently, the A-7F has been evaluated against this MRP by Air Force and independent study groups. At an Air Force meeting of the A-7F General Officer Steering Group in October 1988, a final avionics configuration was agreed upon. In addition, cost estimates were finalized at the same meeting. It was agreed that the unit fly-away cost using a new P&W F100-PW-200 engine was $6.8 million.

The updated schedule for the A-7F program (for planning purposes) is, as follows:

Prototype Flight Testing:	
Start	July 1989
End	June 1990
Avionics Integration:	
Decision	September 1988
Contract Award	March 1990
Production Decision:	November 1989
First Aircraft Input	November 1992
First Aircraft Output	April 1994
QOT&E	April 1994

The production decision will not be made until after five months into the flight test program, and it will have to be approved by the Secretary of Defense.

Essentially all those concerns raised by GAO have been addressed and resolved by the Air Force and are not currently affecting the pace of the A-7 development program.

WWMCCS INFORMATION SYSTEM

Question. The World Wide Military Command and Control System (WWMCCS) Information System is a multi-billion dollar command and control computer program for the Services for which the Air Force has the lead.

In 1983, WIS was estimated at $1.7 billion. In 1986, it was $2.3 billion. What is the current estimate?

Answer. As reported in our annual December 1988 Selected Acquisition Report, the current estimate remains $2.3 billion. The estimate will be revised and baselined in accordance with the 6 March 1989 Acquisition Decision Memorandum on WIS/WWMCCS ADP Modernization directing a September 1989 DAB review.

Question. Press rumors abound that WIS is in serious trouble. What is the status of the development program?

Answer. The Joint WIS program has had a long history of budget reductions, development problems, and schedule delays. Following a December 1988 execution review, OSD sponsored a ground up relook at the Joint WIS programmatic approach and management structure. On 10 February 1989 the Defense Acquisition Board reviewed the OSD proposal on the WIS restructuring. The Defense Acquisition Board accepted the proposal to transfer the Executive Agency from the Air Force to the Defense Communications Agency (DCA) and approved a new program strategy for the modernization of the WWMCCS ADP. DCA will pursue a program strategy that involves testing and validation of commercial-off-the-shelf products planned for integration into the WWMCCS ADP environment. Products will be acquired by the sites from standard government requirements contracts already in existence, from new contracts sponsored by a lead military department, or from public or government domain capabilities. DCA has been directed to report back to the DAB within six months for a program status assessment. DCA will also have prepared an integration strategy, reviewed by the Joint Staff, to satisfy and confirm that the continued Joint Operation and Planning Executive System (JOPES) development activity proposed by DCA is responsive to the near term JOPES requirements. It is important to note that the above response relates to the Joint WIS program only and the Service/Agency WIS programs are not addressed.

Question. Is WIS being transferred from the Air Force to the Defense Communications Agency? If so, why?

Answer. Yes. On March 6, the Deputy Secretary of Defense (DEPSECDEF) approved a major change in the acquisition strategy being employed for the modernization of WWMCCS ADP. After review and recommendation by the Defense Acquisition Board, DEPSECDEF approved: (1) the WWMCCS ADP Modernization program integration and implementation strategy which emphasizes the integration of commercial-off-the-shelf, nondevelopmental items, public and government domain capabilities, standard requirements contracts and early incremental fielding of improved capabilities and (2) the transfer of executive agency responsibility from the Air Force to the Defense Communications Agency (DCA). The resulting program, under the leadership of DCA will provide frequent, incremental improvements to the existing WWMCCS ADP which will result in improved products being provided to the operational commanders quicker and more frequently than previously planned.

Question. What does the transfer say about the Air Force's commitment to the program?

Answer. The Air Force continues to support the WWMCCS ADP Modernization and considers the development and fielding of the Joint Operation and Planning Execution System (JOPES), as the

most important part of the program. The Air Force will continue supporting WWMCCS ADP and the modernization program by providing single service l;ogistics and training support for the program, serving as the lead military department for the workstation acquisition, and providing WWMCCS standard ADP contracting support, The program changes were a corporate DoD decision in which the Air Force participated. The changes involve more than a transfer of executive agency role, they involved a totally different strategy for modernizing the WWMCCS ADP and the Air Force supports that strategy.

Question. How will the $73 million being requested in FY 1990 for Air Force WIS be used?

Answer. The $73 million requested in the FY 1990 President's Budget was for the Air Force execution of the Joint WIS program prior to the transition, the Air Force planned to complete AMHS DT&E, the DCA conducted Integrated Systems Test of the Block A components, and the development of Block B, Release 1 software. However, due to the transfer of WWMCCS modernization responsibilities to DCA and the tasking to return to the DAB six months for a program status assessment, DCA is currently preparing the required documentation and analysis for DAB support of a baselined program. The results of this effort to modernize WWMCCS ADP will be presented to the September 1989 DAB for their review and approval. Preliminary cost estimates for the DCA strategy are currently under review and DoD is deliberating on the level of funding support to provide to the WWMCCS ADP Modernization in the amended budget submission.

NOTE.—Services have provided independent responses to the following questions.

Air Force Input

The Air Force input in made up of two parts: Air Force Joint WIS and Air Force WIS (AFWIS).

Question. Provide for the record the funding for all DOD WIS efforts in each fiscal year 1987 to 1994 by appropriation and line item.

Answer. Air Force—Joint WIS Appropriation: 3600.

[In millions of dollars]

	Fiscal years—							
	1987	1988	1989	1990	1991	1992	1993	1994
Program element:								
0303154F	91.0	19.1	66.4	73.0	68.6	47.4	88.9	105.9

Question. Describe what work is to be done, and by whom;

Answer. The Air Force planned to complete BLOCK A (Local Area Network Automated Message Handling System, WIS Workstation, Software Development Maintenance Environment) and to execute the full scale development of the program for which the Air Force was seeking DAB approval in September 1989. However, by direction of the 6 March 1989 Deputy Secretary of Defense Ac-

quisition Decision Memorandum, the Air Force was tasked to conclude all remaining WIS development activities in the best interest of the government. The Air Force, however, will continue as the existing single Service training manager, single service logistics support manager and the contracting agent for WWMCCS ADP. The Air Force will also complete award of the WIS workstation contract and ensure uninterrupted contract maintenance support of the WIS early products.

As the new Executive Agent for the WWMCCS ADP modernization program, DCA is putting together a totally new implementation strategy for review by the Defense Acquisition Board (DAB) in September 1989. The program approved by the 10 February 1989 DAB changed from a developmental approach pursued by the Air Force to a nondevelopmental integration approach by DCA based on a frequent, incremental capability fielding strategy.

Question. Also provide an explanation of all unobligated appropriations in the DoD WIS program;

Answer. Appropriation: 3600.

[In millions of dollars]

	Fiscal year—	
	1988	1989
Program element:		
0303154F	0.5	19.6

FY 1988: These funds are being used for proposal preparation costs of (1) the WIS workstation competitive award and (2) the now defunct GTE FPIF contract extensions that were planned for award in FY 1989.

FY 1989: These funds are being used for contracts disposition and program transition costs. Included are funds for the competitive award of the WIS workstation contract, contractual liabilities already incurred (award fees, over target costs, proposal preparation costs), funds transferred to the Defense Communications Agency and USTRANSCOM, termination costs and System Program Office support.

Question. Indicate what the government is contractually committed to in the DOD WIS, and relate the contracts at target to the budget in each fiscal years 1987–1991.

Answer. Contractor Name: GTE. Contract Name: Integration (Increment 4) Contract.

[In millions of dollars]

	Fiscal years—				
	1987	1988	1989	1990	1991
Contract:					
Budget amount	58.9	8.6	10.9	0	0

Contractor Name: IBM. Contract Name: Common User Contracts.

[In millions of dollars]

	Fiscal years—				
	1987	1988	1989	1990	1991
Contract:					
Budget amount	27.0	13.5	0.3	0	0

Question. Provide the latest cost performance estimates for each of the contracts for both contractor and government estimates.

Answer. Contractor Name: GTE. Contract Name: Integration (Increment #4) Contract. Contractor's Estimate at Completion: $123.5 million. Program Manager's Estimate at Completion: $124.8 million. Contractor's Name: IMB. Contract Name: Common User Contract. Contractor's Estimate at Completion: $94.9 million. Program Manager's Estimate at Completion: $95.9 million.

NOTE.—Ceiling Price, or total government liability, is $40.5 million, all other costs are the responsibility of the contractor.

Question. Provide for the record the funding for all DOD WIS efforts in each fiscal year 1987 to 1994 by appropriation and line item.

Answer. Air Force—WIS (AFWIS) Appropriation: 3080.

[In millions of dollars]

	Fiscal years—							
	1987	1988	1989	1990	1991	1992	1993	1994
Program element:								
0303152F	8.1	0	11.0	14.9	15.0	22.8	26.0	30.5

Appropriation: 3600.

[In millions of dollars]

	Fiscal years—							
	1987	1988	1989	1990	1991	1992	1993	1994
Program element:								
0303152F	6.6	5.1	2.3	3.4	3.7	0.8	0.9	1.0

Appropriation: 3400.

[In millions of dollars]

	Fiscal years—							
	1987	1988	1989	1990	1991	1992	1993	1994
Program element:								
0303152F	12.8	16.8	14.7	13.5	18.1	21.3	17.0	18.1

Question. Describe what work is to be done, and by whom.

Answer. The Air Force WIS (AFWIS) program is tasked with the acquisition and installation of hardware and limited development and integration of Air Force software at Air Force sites.

Question. Also provide an explanation of all unobligated appropriations in the DOD WIS program.

Answer. Appropriation: 3080.

[In millions of dollars]

	Fiscal years—		
	1987	1988	1989
Program element:			
0303152F	3.2	0	11.0

Remaining FY 1987 and FY 1989 3080 funding awaiting award of the WIS workstation contract currently scheduled for June 1989.

Appropriation: 3600.

[In millions of dollars]

	Fiscal years—		
	1987	1988	1989
Program element:			
0303152F	0	1.0	0.9

Remaining FY 1988 funding is for integration efforts and workstations for the Air Force operational test site.

Remaining FY 1989 funding is for workstations for the operational test site.

Army Input

Question. Provide for the record the funding for all DOD WIS efforts in each fiscal year 1987 to 1994 by appropriation and line item.

Answer. Army WIS (AWIS) Appropriation: 2035.

[In millions of dollars]

	Fiscal years—							
	1987	1988	1989	1990	1991	1992	1993	1994
Program element:								
0303152A	13.2	6.4	16.4	31.9	31.9	50.9	51.5	43.6

Appropriation: 2040.

[In millions of dollars]

	Fiscal years—							
	1987	1988	1989	1990	1991	1992	1993	1994
Program element: 0303152A	27.4	31.6	23.1	25.1	25.2	37.5	32.4	18.2

Question. Describe what work is to be done, and by whom.

Answer. Army WIS (AWIS) will field command and control (C2) information systems supporting crisis management, mobilization, deployment, employment and sustainment of strategic and tactical Army forces; will implement the JOPES; and acquire, integrate and install C2 telecommunications, hardware, software and required functionalities in command center complexes at Echelons Above Corps (EAC).

Question. Also provide an explanation of all unobligated appropriations in the DoD WIS program:

Answer. Appropriation: 2035.

[In millions of dollars]

	Fiscal years—		
	1987	1988	1989
Program element: 0303152A	0.1	0	6.6

The unobligated balance for FY87 is being used to cover minor obligation adjustments on existing contracts. The FY89 unobligated funds will be used for procurement of communications equipment and workstations in the third and fourth quarters of FY89 in accordance with AWIS obligation plan.

Appropriation: 2040.

[In millions of dollars]

	Fiscal years—		
	1987	1988	1989
Program element: 0303152A	0	0	10.3

The FY89 unobligated balance is fully committed and pending obligation on five ongoing contracts for software development, program management technical support, site technical support, independent verification and validation, and Ada studies. These funds will be completely obligated in the third quarter of FY89 in accordance with the AWIS obligation plan.

Question. Indicate what the government is contractually committed to in the DoD WIS, and relate the contracts at target to the budget in each fiscal year 1987–1991.

Answer. Army WIS. Contractor's Name: TRW, Inc. Contract Name: Army Software Development.

[In millions of dollars]

	Fiscal years—				
	1987	1988	1989	1990	1991
Contract:					
Budget amount	7.4	21.3	16.5	17.1	15.5

Contractor's Name: Systems Research and Applications Corp. Contract Name: AWIS Architecture Design Contract.

[In millions of dollars]

	Fiscal years—				
	1987	1988	1989	1990	1991
Contract:					
Budget amount	4.5	4.3	1.8	3.8	3.9

Question. Provide the latest cost performance estimate for each of the contracts for both contractor and government estimates.

Answer. Contractor's Name: TRW, Inc., Contract Name: Army Software Development. Contractor's Estimate at Completion: $247.7 million. Program Manager's Estimate at Completion: $185.7 million.

Contractor's Name: Systems Research and Applications Corp. Contract Name: Architecture Design Contract. Contractor's Estimate at Completion: $28.4 million. Program Manager's Estimate at Completion: $28.4 million.

Defense Communications Agency Input

Question. Provide for the record the funding for all DOD WIS efforts in each fiscal year 1987 to 1994 by appropriation and line item.

Answer. Appropriation: 0300.

[In millions of dollars]

	Fiscal years—							
	1987	1988	1989	1990	1991	1992	1993	1994
Program element:								
0303152K	1.2	0.3	0.5	0	1.4	4.4	8.0	11.0

Question. Describe what work is to be done, and by whom.

Answer. Funding is for the purchase of ADP hardware to satisfy requirements for message handling and the management of large data bases.

Question. Also provide an explanation of all unobligated appropriations in the DOD WIS program.

Answer. Appropriation: 0300.

[In millions of dollars]

	Fiscal years—		
	1987	1988	1989
Program element:			
0303152K	0	0.2	0.5

The $0.2 million of FY88 funds were originally committed for a WIS Block A system exerciser. These funds are no longer required for this purpose and will be utilized for other DCA requirements.

Of the $0.5 million of FY89 funds, $0.3 million was obligated during March 1989 for the purchase of networking hardware and software. The remaining $0.2 million will be used for the purchase of an uninterruptable power supply.

Defense Nuclear Agency Input

Question. Provide for the record the funding for all DOD WIS efforts in each Fiscal Year 1987 to 1994 by appropriation and line item.

Answer. Agency: DNA. Appropriation: 0100.

[In millions of dollars]

	Fiscal years—							
	1987	1988	1989	1990	1991	1992	1993	1994
Program element:								
0303152H	0.3	0.1	0	0	0	0.2	0	0.2

Appropriation: 0300.

[In millions of dollars]

	Fiscal years—							
	1987	1988	1989	1990	1991	1992	1993	1994
Program element:								
0303152H	0.1	0.8	0.4	0	0.3	1.4	0.2	0

Question. Describe what work is to be done, and by whom.

Answer. In past fiscal years we have used the WIS appropriations to purchase WIS workstations and a WIS Local Area Network design. In future years we will purchase additional upgraded workstations, a WIS processor to include an interface unit and processor software. We have no WIS efforts in progress at present.

Question. Also provide an explanation of all unobligated appropriations in the DOD WIS program.

Answer. We have no unobligated appropriations in this program.

Marine Input

Question. Provide for the record the funding for all DOD WIS efforts in each Fiscal Year 1987 to 1994 by appropriation and line item

Answer. Appropriation: 1109.

[In millions of dollars]

	Fiscal years—							
	1987	1988	1989	1990	1991	1992	1993	1994
Program element:								
0701111 M	0.7	0.3	0.2	0.2	0.2	0.2	0.2	0.2

Question. Describe what work is to be done, and by whom.

Answer. The Marine Corps WWMCCS project consists of establishing and operating thirty-six remote terminal sites. The following are general tasks:

Program management is performed by the C4 Division, Headquarters, U.S. Marine Corps.

Acquisition of automated data processing equipment is accomplished by the Marine Corps Research, Development and Acquisition Command and the Air Force Electronic Systems Division from Joint Contracts.

Acquisition of communications support equipment is performed by the Marine Corps Research, Development and Acquisition Command.

Question. Also provide an explanation of all unobligated appropriations in the DOD WIS program.

Answer. Appropriation: 1109.

[In millions of dollars]

Program element:	*Fiscal year 1989*
0701111 M	0.2

Unobligated FY89 Procurement, Marine Corps funding is pending System Development Notification approval. It is to be used to purchase automated data processing equipment for Marine Corps WWMCCS remote terminal sites. One hundred percent obligation of FY89 funding will be accomplished by the end of FY89.

Question. Indicate what the government is contractually committed to in DOD WIS, and relate the contracts at target to the budget in each FY1987 to 1991.

Answer. Not applicable.

Navy Input

Question. Provide for the record the funding for all DOD WIS efforts in each Fiscal Year 1987 to 1994 by appropriation and line item.

Answer. Service: Navy (unique). Appropriation: RDT&E. Program Element:

PE 0303152N.

[Dollars in millions]

Fiscal year:	
1987	$6.1
1988	4.5
1989	4.6
1990	6.0
1991	3.9
1992	5.0
1993	4.3
1994	6.2

Appropriation: OPN (BA–2). Program Element:

PE 0303152N.

[Dollars in millions]

Fiscal year:	
1987	$.04
1988	.5
1989	1.1
1990	.3
1991	.3
1992	.4
1993	.5
1994	.5

Appropriation: OPN (BA–7). Program Element:

PE 0303152N.

[Dollars in millions]

Fiscal year:	
1987	−$2.7
1988	—
1989	1.3
1990	3.8
1991	1.5
1992	6.0
1993	4.7
1994	8.4

Appropriation: O&M,N (BA–3). Program Element:

PE 0303152N.

[Dollars in millions]

Fiscal year:	
1987	$4.6
1988	2.6
1989	4.1
1990	5.0
1991	7.0
1992	11.0
1993	13.6
1994	13.7

Question. Describe what work is to be done, and by whom.

Answer. Appropiation: RDT&E. The Navy is supporting modernization of command and site unique software at Navy supported sites which is required in the transition to JOPES.

Answer. Appropriation: OPN. The Navy's procurement effort provides WIS hardware (BA–7) and supporting communications equipment (BA–2) to support the WIS ADP equipment configuration at the Navy supported sites which are: The headquarters of the US Atlantic Command and US Pacific Command Unified commands, the headquarters at US Forces Korea and US Forces,

Japan Subordinate Unified Commands, the Navy Component Commanders CINCLANTFLT, CINCPACFLT, CINCUSNAVEUR and the Chief of Naval Operations.

Answer. Appropriation: O&M,N. Provides for continued design, upgrade, and maintenance of the Navy WIS application systems computer programs and WIS utility computer programs assigned to the Navy. It also provides for Navy WIS site preparation, engineering, installation and integrated logistic support for the Navy WIS ADP and associated communications equiment at all Navy WIS nodes.

Question. Also provide an explanation of all unobligated appropriations in the DOD WIS program.

Answer. Service/Agency: Navy. Appropriation: RDT&E. Program Element:

0303152N.

[Dollars in millions]

Fiscal year:	
1987	0.0
1988	0.0
1989	$0.3

Contract providing engineering support will be awarded early May, obligating $.3 million.

Answer: Service/Agency: Navy. Appropriation: O&M,N. Program Element:

0303152N.

[Dollars in millions]

Fiscal year:	
1987	0.0
1988	0.0
1989	$1.7

This appropriation is distributed in quarter allocations. The $1.7 million will become available in April and July 1989. All funds will be obligated at the beginning of each quarter.

Answer. Service/Agency: Navy. Appropriation: OPN (BA-2, 7). Program Element:

0303152N

[Dollars in millions]

Fiscal year:	
1987	0.0
1988	$0.5
1989	2.4

Anticipate contract award for the Navy WIS communications equipment June 1989. Once contract is awarded, $1.6 million (BA-2) FY88 and FY89 funds will be obligated. Contract award for WIS workstations will be awarded June 1989. Once contract is awarded $1.3 million (BA-7) FY89 funds will be obligated.

Question. Indicate what the government is contractually committed to in DOD WIS, and relate the contracts at target to the budget in each Fiscal Year 1987 to 1991.

Answer. Contractor Name: (RDT&E) Andrulis Research Corporation.

Navy Unique Software.

[RDT&E dollars in millions]	Contract budget amount
Fiscal year:	
1987	0
1988	2.8
1989	3.8
1990	4.0
1991	2.8

Contractor Name: To be determined.

Software maintenance

[O&M,N dollars in millions]	Contract budget amount
Fiscal year:	
1987	0
1988	0
1989	0
1990	0.3
1991	1.4

Question. Provide the latest cost performance estimates for each of the contracts for both contractor and government estimates:

Answer. Contractor's Name: Andrulis Research Corporation. Contract Name: Navy Unique Software Development. Contractor's Estimate at Completion: $25 million. Program Manager's Estimate at Completion: $25 million. Contractor's Name: To be determined. Contract Name: Software Maintenance. Contractor's Estimate at Completion: TBD. Program Manager's Estimate at Completion: $172 million.

RANGE IMPROVEMENTS

Question. The Air Force is requesting $118 million for range improvements in FY 1990, up from $20 million in FY 1989.

Explain your strategy for improvements at your test ranges.

Answer. The primary objective in improving Air Force test and training ranges is to provide realistic threat environment for Development Test and Evaluation (DT&E), Operational Test and Evaluation (OT&E), and tactics development/training. The Range Improvement Program (RIP) supports DT&E, and training but is not funded at a level to satisfy all Air Force requirements. Internal Air Force prioritization is part of a continuing investment strategy to consolidate individual range requirements to a balanced development and acquisition program.

Program requirements are generated by individual ranges or test organizations and then reviewed by their Major Command or Separate Operating Agency. When a requirement has been validated at that level, it is then forwarded to Headquarters, Air Force Systems Command and Headquarters, Air Force Logistics Command where intelligence and technical feasibility are evaluated, a program schedule is developed, and a cost estimate is accomplished. This information is returned to the originating commands and individual ranges for study and prioritization with other programs. In June of each year of the Range Improvement Program Requirements Review, with representatives from the operational commands, the intelligence community, development and acquisition managers, and testing and logistics specialists in attendance, alternative in-

vestments are compared. The review results in a prioritized listing by year against available funds. This prioritization is validated by the using commands and forwarded to HQ USAF in the commands' Program Objective Memorandum (POM) submissions where the Range Improvement Program reviewed and prioritized against other Air Force programs.

Question. What specific items will be developed?

Answer. In addition to the Mission Engineering/Support project which provides basic operating support, system software acquisition and systems engineering support such as studies, assessment, and analysis, the following four projects provide for the specific developments.

Tactical Air Forces Range Equipment—includes development and improvements of Air Combat Maneuvering Instrumentation (ACMI), Unmanned Threat Emitter, Red Flag Measurement and Debriefing System, Laser Engagement System, Red Forces Command and Control System, Range Control System, Automated ECM Analysis and Advanced Threat Training Simulations.

Strategic Air Command Range Equipment—includes development and improvement of Route Integration Instrumentation System, Advanced Threat Emitter, ACMI Bomber Interface, and Multiple Receiver System.

Electronic Combat Test Resources—includes development, fabrication and validation of digital simulations and hybrid simulator facilities such as Electronic Combat Digital Evaluation System, the Air Force Electronic Warfare Evaluation Simulator, Red Capabilities Simulator, the Pre-Flight Integration of Munitions and Electronic Systems Facility, the Guided Weapons Evaluation Facility and the Radar Test Facility.

Flight Test Threat Systems Simulators—provides for development and mondernization of the Electromagnetic Test Environment which provides test quality simulators of advanced Soviet air defense radar equipment.

Question. What is the urgency that requires 500% growth in a single fiscal year?

Answer. The increase from $20 million in FY 1989 to $118 million in FY 1990 is primarily attributed to consolidation and restructuring between program elements (PEs) as follows:

A. In FY 1989 the Electronic Combat Test Resources line was funded at $34.8 million in two other PEs. The consolidation into the Range Improvement PE 0604735F reflects Air Force efforts to maximize the benefit of laboratory simulator developments to range activities.

B. In FY 1989 the Flight Test Threat Systems Simulators line was reduced by a one year $20 million consolidation into OSD PE 0605134D.

If these efforts had been funded in PE 064735F in FY 1989, the increase would be from $75 million to $118 million. The remainder of the increase in primarily attributed to the development of a simulator of an advanced Soviet surface-to-air system along with other simulator modifications required to reflect intelligence upgrades and maintain the validity of the existing test resources.

Question. Provide for the record the R&D funding for each element of the range improvement line in each Fiscal Year from 1988

to 1994. Also indicate total R&D and total procurement cost estimates for each element.

Answer. PE0604735F.

[Dollars in millions]

	Fiscal year—						
	1988	1989	1990	1991	1992	1993	1994
Mission/Engr Sup	3.0	4.7	3.0	3.1	3.3	3.4	3.5
TAF Range Equip	10.0	6.5	10.4	12.5	7.3	11.7	11.8
SAC Range Equip	3.7	6.2	11.2	10.2	8.6	8.9	9.1
EC Test Resources	(1) 2.2	(1) 2.1	35.2	43.1	25.3	29.8	27.3
Threat Sim	(2) 35.8	.4	47.3	24.9	21.1	13.6	13.9
Total R&D	(3) 54.7	(3) 19.9	118.1	102.2	65.6	67.4	65.6
Total production	175.3	119.4	115.8	114.2	102.7	99.6	144.6

[1] In FY 1988 and FY 1989 other PEs funded at $26.6 million and $34.8 million.
[2] In FY 1989 $20 million was moved to OSD PE for same type of work.
[3] In FY 1988 and FY 1989 other PEs funded at $26.6 million and $34.8 million.

[CLERK'S NOTE.—End of questions submitted for the record.]

WEDNESDAY, APRIL 26, 1989.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, DEFENSE AGENCIES; OPERATIONAL TEST AND EVALUATION

WITNESS

HON. JOHN E. KRINGS, DIRECTOR, OPERATIONAL TEST AND EVALUATION

INTRODUCTION

Mr. HEFNER. The committee will come to order.

This afternoon the committee will receive testimony on selected programs from the Defense Agencies RDT&E budget request for fiscal year 1990. This account totals $10 billion for fiscal year 1990; $5.6 billion of that amount is for the Strategic Defense Initiative, which the committee has heard in a separate hearing.

Today we will hear from two agencies. First, Mr. John Krings, the director of Operational Test and Evaluation; and second, from the Defense Advanced Research Projects Agency, DARPA. Due to the classification of material to be discussed, the hearing will be closed.

Mr. Krings, the committee has several concerns about the management of your office, and we welcome the opportunity to discuss them with you. Before we begin with questions, please proceed with a summary of your prepared remarks. Your entire statement will be made a part of the record. We are happy to have you before the committee.

SUMMARY STATEMENT OF MR. KRINGS

Mr. KRINGS. Thank you, Mr. Chairman and Members of the committee.

I am here today to discuss the OT&E fiscal year 1991 budget. I have a statement for the record, which you have generously offered to enter.

You have designated me the principal advisor on operational testing to the Secretary of Defense and to the Under Secretary of Defense for Acquisitions, and the principal operational testing official in the Department of Defense. My primary goal is to ensure that the soldiers, sailors, airmen and Marines receive operationally effective and suitable weapons and equipment. We must be the voice of the user. The most visible product of my office is the beyond low-rate initial production, B-LRIP, report which assesses the effectiveness and suitability of a weapon system for combat before a full-rate production decision may be made. As the depth of my involvement in individual operational test programs grew, the magnitude and severity of shortfalls in operational test capability

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became apparent. In keeping with my responsibility under Title 10, I review and make recommendations to the Secretary of Defense on budgetary and financial matters relating to operational testing, including facilities and equipment.

OT&E CAPABILITY PROGRAM

In 1986, I brought forward a budget issue for OT&E capability improvement. The program by that name—OT&E capability improvement program, CIP—approved by the Department initially as a fiscal year 1987 supplemental item, continues through the five-year defense plan, and accounts for over 80 percent of my appropriation budget. The remainder of the budget provides for the general operating support of the DOT&E. Secretary Weinberger and the DOD strongly supported us in this issue. As signified by approval of a fiscal year 1987 supplement, the CIP is vital to our efforts to improve the adequacy and realism in the near term and to bring operational test capabilities more in line with developmental test capabilities. The importance of the CIP has not diminished with time. But, unfortunately, its impact has. Although we hit the ground running and demonstrated the ability to improve test realism, we have been stalled in fiscal year 1989 for over six months because of questions raised by this committee.

We believe satisfactory answers to these questions were provided in January. Therefore, to talk to you about fiscal year 1990 and 1991 requirements on a solid footing, I must first address the lingering fiscal year 1989 CIP issues, which I know is of interest to the committee.

OT&E CIP

The OT&E CIP: Upon assuming my duties as DOT&E, I realize that if operational testing was to improve as both the Secretary and Congress wanted, I would have to become directly involved. It was necessary to impose standards on the services in order to adequately fund operational testing to ensure a robust test environment.

Inadequate representation of the threat was a major problem. I had put considerable faith in the ongoing threat simulator programs to provide the threat systems for the national testing capability, but most of those simulator programs take a long time to come to fruition due to intelligence considerations. This problem is created by two factors: (1) the determination of how much intelligence data is required to initiate threat simulator development; and (2) the difficulties of replicating Soviet design using U.S. technology and hardware.

Non-availability of threat simulators for operational testing was also an issue. A given threat system for developmental testing may have been represented by more than one subsystem on separate ranges, all of which were bolted down and capable of operating only with each host's range instrumentation.

This approach can satisfy developmental testing which can be conducted—subsystem by subsystem in a one-on-one scenario. This method is adequate for developmental testing but inadequate for

operational testing which requires force-on-force relationships in a dense realistic threat environment.

Operational tests were being conducted with serious test resources limitations. We couldn't properly stress systems. Decisions to go into full-rate production were made without the best information.

I have set out to correct as many limitations associated with scheduled operatioal tests as possible. I adopted a course of action that consisted of providing threat systems, clones, or surrogates, to replicate the threat as realisitically as possible. The salient issue was to provide near-term, critical threat systems to scheduled operatioal tests.

FISCAL YEAR 1989 BUDGET

The service have played a significant role in the development of the budget. I was prepared to execute the fiscal year 1989 budget in December; however, due to conference report language, the funds have been withheld by the OSD controller. The DOD has satisfied all the requirements set forth in the report language. The Services have played an intensive role in the development of the budget and are in full support. Execution plans have been prepared in concert with the services.

I am still in a position to obligate fiscal year 1989 funds in an expeditious manner consistent with DOD goals. To withhold funds any longer would jeopardize any attempt to correct deficiencies that demand action now.

The CIP approach has matured significantly since its inception. It has a coordinated approach which is predictable, consistent, and directed specifically to solving test resource shortfalls related to prioritized scheduled operational tests. It allows the Services to solve their own problems and still retain the desired direction to throughly stress blue systems in the operational testing environment.

FISCAL YEAR 1990–1991 BUDGET

The CIP has been a catalyst for the exchange of ideas between OSD and the Services. The 1990-91 budget was developed and coordinated with the Services. It represents quantifiable solutions to scheduled operational test needs, not five or ten years from now. CIP plans have been developed that demonstrate my intent to execute faithfully the budget as presented to Congress. Lead Services have been identified for the execution of projects in the budget.

For many systems, the capability does not exist today to conduct adequate operational test and evaluations. Operational tests and evaluations are still conducted using facilities designed primarily for developmental testing and/or training. My fiscal year 1990-91 budget is a continuing attempt to overcome this problem and focuses on my initiative to establish an operational test capability prioritization at the national level. However, the fiscal year 1990-91 budget cannot be examined in isolation due to the effect of deferring the expenditure of the fiscal year 1989 budget.

The services have presented 92 projects for the fiscal year 1990-91 budget which are required for scheduled operational tests and

represents serious limitations in test resources. Total demand for resources exceeded what could reasonably be expected under a constrained budget environment. A prioritization process has ensured that the highest return investments would be satisfied in the initial submission. These are not requests for gold-plated capabilities. They are requests for the bare bones which solve the most pressing problems in operational test and evaluation. These involve interoperability of equipment, instrumentation, and threat systems. My budget addresses all of these concerns and focuses energy on the most time-critical issues. You can readily see that the fiscal guidance provided to me barely scratches the surface and allows for improvement in only selected tests. My budget is designed to continue the program I began in fiscal year 1988 to incorporate realism, force-on-force engagements, integration of red and blue forces, valid end-game solutions and survivability determination. It was a program that initially addressed only air-to-air and air-to-ground environments.

It now includes ground-to-ground and sea-to-sea and provides support for test planning and exercises. It also establishes the joint mobile operational test force, JMOTF, which provides resources to ensure realistic operational tests. The JMOTF concept was briefed and coordinated with the Services and has their support. The Services participate in a corporate body which I chair to determine the prioritized utilization of JMOTF assets.

MANAGEMENT

My final issue is one of management. In the early stages of the CIP, the Services lobbied extensively against the initiative. The Services now think differently. I have developed a methodology which guarantees nothing to the Services without justification. I don't subscribe to the slice-of-the-pie theory. That is, I don't want to give a bag of money to split three ways. It is based on the most critical issues facing the OT&E community and it establishes a prioritized list of national operational tests. If you don't have a requirement relative to that list, there is no need to apply for that money. I developed specific policy guidance and clearly described the process in a master plan. There should be no question in anyone's mind what is expected from the program and how it will operate.

Once a request for resources has satisfied the CIP ground rules, it competes openly with all others for funding. Many requests for resources are withdrawn when a requestor finds another Service already possess that capability and it is available for use. In those instances, a limitation of test resources has been rectified and a test improved without the expenditure of funds. Once the decision has been made to fund a project and a lead Service has been identified, we enter into a formal agreement with that Service to ensure the program is executed. I have provided the mechanism and discipline for the Services to seek our solutions to operational test and evaluation problems as a community. This represents a degree of discipline they have never known before. They recognize the CIP is the only real answer for operational test resources and support it to a degree I honestly did not think was possible.

You have placed me in charge of ensuring credible operational tests and evaluations are conducted in the Department of Defense. I have isolated and identified relevant problems and chosen a prudent course of action that is supported by the Services. I intend to continue to pursue my responsibilities as explained here today and request your continued support in doing so. Your support of my fiscal year 1990–91 budget is imperative if we are to meet the objectives you have established.

Without a 1989 program, discussion of the years beyond cannot be fruitful. I sincerely request this committee to direct the release of the fiscal year 1989 appropriation.

DOT&E BUDGET

Looking at our DOT&E operating budget, the DOT&E operating budget is program element 0605118D, Director of Operational Test and Evaluation. The total request for fiscal year 1990 is $25.7 million and for fiscal year 1991 is $26.7 million. With half of these funds I perform oversight activities on more than 175 programs. Review of these programs begins with their designation as major defense acquisition or special interest programs oversight continues through early acquisition milestones and the beyond-LRIP production decisions.

This portion of my budget primarily funds contracted technical and analytical assistance needed to support specific program and testing capability oversight activities, including a program of on-site reviews and observations of OT&E progress.

In response to the conference report on the fiscal year 1989 DOD Authorization Act which emphasized my responsibilities to "* * * provide timely assessments necessary to support milestone decisions" on the strategic defense system, I have begun an initiative which would facilitate the conduct of early operational assessments for this program. Within my organization, I have identified a deputy director responsible for strategic offense, defense and space systems.

While this Deputy for Strategic Systems actively pursues OT&E oversight of all major strategic programs, to include the B–1B, B–2, MX Rail Garrison, and Small ICBM systems, he has also begun an effort to address operational assessment and evaluation concerns for the Strategic Defense System, SDS. Since the SDS is an OSD-managed program, it still resides in OSD. The Secretary determined that the plans and execution for the required system level early operational assessment must also remain at the OSD level. Due to budget constraints, my activities on SDS this year have been limited to developing institutional relationships with each Service and their operational test activities. This will ensure a thorough and comprehensive operational assessment and evaluation approach to this complex national program. Actual early operational assessment activities will begin in fiscal year 1990. In order to maintain a truly integrated program, all funding for the Service operational test agencies and DOT&E SDS activities have been consolidated within the DOT&E program element. Consistent with the memorandum of understanding we have with the Services, funding will be distributed to each Service operational test agency. This

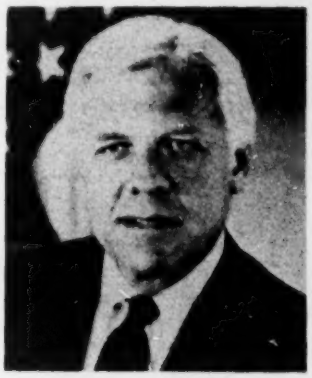
consolidated funding accounts for the increase in my fiscal year 1990, fiscal year 1991 budget, and represents the second half of the effort in this program element.

I need your support for the release of fiscal year 1989 funds, and for the fiscal year 1990–1991 budget. Only then will we met the objective set by the Congress and supported by the Secretary of Defense to give our soldiers, sailors, airmen and marines weapon systems and equipment that are effective and suitable.

Mr. HEFNER. Thank you, Mr. Krings.

[The statement of Mr. Krings follows:]

THE HONORABLE JOHN E. KRINGS
DIRECTOR, OPERATIONAL TEST AND EVALUATION



The Honorable John E. (Jack) Krings is the first Director of Operational, Test and Evaluation (OT&E), Office of the Secretary of Defense. He has the unique role of serving as the independent evaluator of operational testing for both the Secretary of Defense and the United States Congress, and holds a rank equivalent to that of Assistant Secretary of Defense.

Mr. Krings was born April 2, 1930, in Pittsburgh, Pennsylvania. He graduated from Central Catholic High School, attended Duquesne University, and graduated from Louisiana State University in 1952 with a Bachelor of Science degree in chemistry and physics. Upon graduation, he was commissioned in the U.S. Air Force and flew fighters in Korea and Japan for four years.

He joined the McDonnell Aircraft Company in 1956, flying fighters in the Missouri Air National Guard and test flying F-3H Demons and F-101 Voodoos at McDonnell. In 1960, he attended the U.S. Navy Test Pilot School at Patuxent River, Maryland, and after being recalled for a period of active duty in France with the Air National Guard, he returned to St. Louis to participate in the testing of all models of the F-4 Phantom during the development program for that aircraft. He then participated in the design and development of the F-15 Eagle. He was a test pilot in all phases of the F-15 development program and flew the spin tests in the Eagle—for which he received the 1975 "Test Pilot of the Year" Award from the Society of Experimental Test Pilots. In November 1978, he flew the F-18 Hornet on its first flight.

Mr. Krings was the Director of Flight Operations and Chief Test Pilot for McDonnell Douglas, continuing his active test flying of F-15's and F-18's until October 1983, when he moved to Washington, D.C., to become the Director of the McDonnell Douglas Corporation Navy and Marine Corps Program. In 1985, he retired from McDonnell Douglas to accept appointment by President Reagan as the Director of Operational Test and Evaluation. Mr. Krings was confirmed as Director, OT&E, by the U.S. Senate on April 25, 1985.

In addition to Mr. Krings receiving the "Test Pilot of the Year" Award, he received the Jimmy Doolittle Award for outstanding professional accomplishment in aerospace technical management in 1986 and he was recently presented the highest Pentagon honorary award given to civilians—the Department of Defense Medal for Distinguished Public Service.

D E P A R T M E N T O F D E F E N S E

PRESENTATION TO THE HOUSE APPROPRIATIONS COMMITTEE

APRIL 26, 1989

SUBJECT: THE OFFICE OF OPERATIONAL TEST AND EVALUATION BUDGET FOR 1990 AND 1991

STATEMENT OF: HONORABLE JOHN E. KRINGS
Director, Operational Test
Evaluation
Department of Defense

Not for Publication Until Released
by the Committee on Armed Services,
United States House of Representatives

YOU HAVE DESIGNATED ME THE PRINCIPAL ADVISER ON OPERATIONAL TESTING TO THE SECRETARY OF DEFENSE AND THE UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND THE PRINCIPAL OT&E OFFICIAL IN THE DEPARTMENT. MY PRIMARY GOAL IS TO ENSURE OUR SOLDIERS, SAILORS, AIRMEN AND MARINES RECEIVE OPERATIONALLY EFFECTIVE AND SUITABLE WEAPONS AND EQUIPMENT. WE MUST BE THE VOICE OF THE USER. THE MOST VISIBLE PRODUCT OF MY OFFICE IS THE BEYOND LOW-RATE INITIAL PRODUCTION (B-LRIP) REPORT WHICH ASSESSES THE EFFECTIVENESS AND SUITABILITY OF A WEAPON SYSTEM FOR COMBAT BEFORE A FULL RATE PRODUCTION DECISION MAY BE MADE. AS THE DEPTH OF MY INVOLVEMENT IN INDIVIDUAL OPERATIONAL TEST PROGRAMS GREW, THE MAGNITUDE AND SEVERITY OF SHORTFALLS IN OPERATIONAL TEST CAPABILITY BECOME APPARENT. IN KEEPING WITH MY RESPONSIBILITY UNDER TITLE 10 I REVIEW AND MAKE RECOMMENDATIONS TO THE SECRETARY OF DEFENSE ON BUDGETARY AND FINANCIAL MATTERS RELATING TO OPERATIONAL TESTING, INCLUDING FACILITIES AND EQUIPMENT. IN 1986 I BROUGHT FORWARD A BUDGET ISSUE FOR OT&E CAPABILITY IMPROVEMENT. THE PROGRAM BY THAT NAME -- OT&E CAPABILITY IMPROVEMENT PROGRAM (CIP) -- APPROVED BY THE DEPARTMENT INITIALLY AS AN FY87 SUPPLEMENTAL ITEM, CONTINUES THROUGH THE FYDP, AND ACCOUNTS FOR OVER 80% OF MY APPROPRIATION BUDGET. THE REMAINDER OF BUDGET PROVIDES FOR THE GENERAL OPERATING SUPPORT OF THE DOT&E.

SECRETARY WEINBERGER AND THE DOD STRONGLY SUPPORTED US IN THIS ISSUE. AS SIGNIFIED BY APPROVAL OF AN FY87 SUPPLEMENTAL THE CIP IS VITAL TO OUR EFFORTS TO IMPROVE THE ADEQUACY AND REALISM IN THE NEAR TERM AND TO BRING OPERATIONAL TEST CAPABILITIES MORE IN LINE WITH DEVELOPMENTAL TEST CAPABILITIES. THE IMPORTANCE OF THE CIP HAS NOT DIMINISHED WITH TIME, BUT ITS IMPACT HAS. ALTHOUGH WE HIT THE GROUND RUNNING AND DEMONSTRATED THE ABILITY TO IMPROVE TEST REALISM, WE HAVE BEEN STALLED IN FY89 FOR OVER SIX MONTHS BECAUSE OF QUESTIONS POSED BY THIS COMMITTEE. WE BELIEVE SATISFACTORY ANSWERS TO THESE QUESTIONS WERE PROVIDED IN JANUARY. THEREFORE, TO TALK TO YOU ABOUT FY 90 AND 91 REQUIREMENTS ON A SOLID FOOTING, I MUST FIRST ADDRESS THE LINGERING FY 89 CIP ISSUES.

OT&E CIP

UPON ASSUMING MY DUTIES AS DOT&E, I REALIZED THAT IF OPERATIONAL TESTING WAS TO IMPROVE AS BOTH THE SECRETARY AND CONGRESS WANTED, I WOULD HAVE TO BECOME DIRECTLY INVOLVED. IT WAS NECESSARY TO IMPOSE STANDARDS ON THE SERVICES IN ORDER TO ADEQUATELY FUND OPERATIONAL TESTING TO INSURE A ROBUST TEST ENVIRONMENT.

INADEQUATE REPRESENTATION OF THE THREAT WAS A MAJOR PROBLEM. I HAD PUT CONSIDERABLE FAITH IN THE ONGOING THREAT SIMULATOR PROGRAMS TO PROVIDE THE THREAT SYSTEMS FOR THE NATIONAL TESTING CAPABILITY, BUT

MOST OF THOSE SIMULATOR PROGRAMS TAKE A LONG TIME TO COME TO FRUITION DUE TO INTELLIGENCE CONSIDERATIONS. THIS PROBLEM IS CREATED BY TWO FACTORS; (1) DETERMINATION OF HOW MUCH INTELLIGENCE DATA IS REQUIRED TO INITIATE THREAT SIMULATOR DEVELOPMENT AND (2) DIFFICULTIES OF REPLICATING SOVIET DESIGN USING U.S. TECHNOLOGY.

NON-AVAILABILITY OF THREAT SIMULATORS FOR OPERATIONAL TESTING WAS ALSO AN ISSUE. A GIVEN THREAT SYSTEM FOR DEVELOPMENTAL TESTING MAY HAVE BEEN REPRESENTED BY MORE THAN ONE SUBSYSTEM ON SEPARATE RANGES, ALL OF WHICH WERE BOLTED DOWN AND CAPABLE OF OPERATING ONLY WITH THE HOST'S RANGE INSTRUMENTATION. THIS APPROACH CAN SATISFY DEVELOPMENTAL TESTING WHICH CAN BE CONDUCTED - SUBSYSTEM BY SUBSYSTEM IN AN ONE-ON-ONE SCENARIO. THIS METHOD IS ADEQUATE FOR DEVELOPMENTAL TESTING BUT INADEQUATE FOR OPERATIONAL TESTING WHICH REQUIRES FORCE-ON-FORCE RELATIONSHIPS IN A DENSE REALISTIC THREAT ENVIRONMENT.

OPERATIONAL TESTS WERE BEING CONDUCTED WITH SERIOUS TEST RESOURCES LIMITATIONS. WE COULDN'T PROPERLY STRESS SYSTEMS. DECISIONS TO GO INTO FULL RATE PRODUCTION WERE MADE WITHOUT THE BEST INFORMATION.

I HAVE SET OUT TO CORRECT AS MANY LIMITATIONS ASSOCIATED WITH SCHEDULED OPERATIONAL TESTS AS POSSIBLE. I ADOPTED A COURSE OF ACTION THAT CONSISTED OF PROVIDING THREAT SYSTEMS, CLONES, OR SURROGATES, THAT REPLICATED THE THREAT AS REALISTICALLY AS POSSIBLE.

THE SALIENT ISSUE WAS TO PROVIDE NEAR TERM CRITICAL THREAT SYSTEMS TO SCHEDULED OPERATIONAL TESTS.

I WAS PREPARED TO EXECUTE THE FY89 BUDGET IN DECEMBER. HOWEVER, DUE TO APPROPRIATION CONFERENCE REPORT LANGUAGE, THE FUNDS HAVE BEEN WITHHELD. THE DOD HAS SATISFIED ALL THE REQUIREMENTS SET FORTH IN THE REPORT LANGUAGE. THE SERVICES HAVE PLAYED AN INTENSIVE ROLE IN THE DEVELOPMENT OF THE BUDGET AND ARE IN FULL SUPPORT. EXECUTION PLANS HAVE BEEN PREPARED IN CONCERT WITH THE SERVICES. I AM STILL IN A POSITION TO OBLIGATE FY 89 FUNDS IN AN EXPEDITIOUS MANNER CONSISTENT WITH DOD GOALS. TO WITHHOLD FUNDS ANY LONGER WILL JEOPARDIZE ANY ATTEMPT TO CORRECT DEFICIENCIES THAT DEMAND ACTION NOW.

THE CIP APPROACH HAS MATURED SIGNIFICANTLY SINCE ITS' INCEPTION. IT HAS A COORDINATED APPROACH WHICH IS PREDICTABLE, CONSISTENT, AND DIRECTED SPECIFICALLY TO SOLVING TEST RESOURCE SHORTFALLS RELATED TO PRIORITIZED SCHEDULED OPERATIONAL TESTS. IT ALLOWS THE SERVICES TO SOLVE THEIR OWN PROBLEMS AND STILL RETAIN THE DESIRED DIRECTION TO THOROUGHLY STRESS BLUE SYSTEMS IN THE OPERATIONAL TESTING ENVIRONMENT.

THE CIP HAS BEEN A CATALYST FOR THE EXCHANGE OF IDEAS BETWEEN OSD AND THE SERVICES. IT WAS WITHIN THE CIP FRAMEWORK THAT THE FY90-91

BUDGET WAS DEVELOPED AND COORDINATED WITH THE SERVICES. IT REPRESENTS QUANTIFIABLE SOLUTIONS TO SCHEDULED OPERATIONAL TEST NEEDS. SOLUTIONS TO PROBLEMS THAT EXIST TODAY WILL BE SOLVED NEAR TERM, NOT FIVE OR TEN YEARS FROM NOW. EXECUTION PLANS HAVE BEEN DEVELOPED THAT DEMONSTRATE MY INTENT TO EXECUTE FAITHFULLY THE BUDGET AS PRESENTED TO CONGRESS. LEAD SERVICES HAVE BEEN IDENTIFIED FOR THE EXECUTION OF PROJECTS IN THE BUDGET.

FOR MANY SYSTEMS, THE CAPABILITY DOES NOT EXIST TODAY TO CONDUCT ADEQUATE OPERATIONAL TEST AND EVALUATIONS. OPERATIONAL TESTS AND EVALUATIONS ARE STILL CONDUCTED USING FACILITIES DESIGNED PRIMARILY FOR DEVELOPMENTAL TESTING AND/OR TRAINING. MY FY 90/91 BUDGET IS A CONTINUING ATTEMPT TO OVERCOME THIS PROBLEM AND FOCUSES ON MY INITIATIVE TO ESTABLISH AN OPERATIONAL TEST CAPABILITY PRIORITIZATION AT THE NATIONAL LEVEL. HOWEVER, THE FY 90/91 BUDGET CAN NOT BE EXAMINED IN ISOLATION DUE TO THE EFFECT OF DEFERRING THE EXPENDITURE OF THE FY 89 BUDGET.

THE SERVICES HAVE PRESENTED 92 PROJECTS FOR THE FY 90/91 BUDGET WHICH ARE REQUIRED FOR PRIORITIZED SCHEDULED OPERATIONAL TESTS AND REPRESENT SERIOUS LIMITATIONS IN TEST RESOURCES. TOTAL DEMAND FOR RESOURCES EXCEEDED WHAT COULD REASONABLY BE EXPECTED UNDER A CONSTRAINED BUDGET ENVIRONMENT. A PRIORIZATION PROCESS HAS INSURED THAT THE HIGHEST RETURN INVESTMENTS WOULD BE SATISIFIED IN THE INITIAL

SUBMISSION. THESE ARE NOT REQUESTS FOR GOLD PLATED CAPABILITIES. THEY ARE REQUESTS FOR THE BARE BONES WHICH SOLVE THE MOST PRESSING PROBLEMS IN OPERATIONAL TEST AND EVALUATION. THESE INVOLVE INTEROPERABILITY OF EQUIPMENT, INSTRUMENTATION, AND THREAT SYSTEMS. MY BUDGET ADDRESSES ALL OF THESE CONCERNS AND FOCUSES ENERGY ON THE MOST TIME CRITICAL ISSUES. YOU CAN READILY SEE THAT THE FISCAL GUIDANCE PROVIDED TO ME BARELY SCRATCHES THE SURFACE AND ALLOWS FOR IMPROVEMENT IN ONLY SELECTED TESTS.

MY BUDGET IS DESIGNED TO CONTINUE THE PROGRAM I BEGAN IN FY 88 TO INCORPORATE REALISM, FORCE ON FORCE ENGAGEMENTS, INTEGRATION OF RED AND BLUE FORCES, VALID END-GAME SOLUTIONS AND SURVIVABILITY DETERMINATION. IT WAS A PROGRAM THAT INITIALLY ADDRESSED ONLY AIR-TO-AIR AND AIR-TO-GROUND ENVIRONMENTS. IT NOW INCLUDES GROUND-TO-GROUND AND SEA-TO-SEA AND PROVIDES SUPPORT FOR TEST PLANNING AND EXERCISES. IT ALSO ESTABLISHES THE JOINT MOBILE OPERATIONAL TEST FORCE (JMOTF) WHICH PROVIDES RESOURCES TO INSURE REALISTIC OPERATIONAL TESTS. THE JMOTF CONCEPT WAS BRIEFED AND COORDINATED WITH THE SERVICES AND HAS THEIR SUPPORT. THE SERVICES PARTICIPATE IN A CORPORATE BODY WHICH I CHAIR TO DETERMINE THE PRIORITIZED UTILIZATION OF JMOTF ASSETS.

MY FINAL ISSUE IS ONE OF MANAGEMENT. IN THE EARLY STAGES OF THE CIP THE SERVICES LOBBIED EXTENSIVELY AGAINST THE INITIATIVE. THE

SERVICES NOW THINK DIFFERENTLY.

I HAVE DEVELOPED A METHODOLOGY WHICH GUARANTEES NOTHING TO THE SERVICES WITHOUT JUSTIFICATION. I DON'T SUBSCRIBE TO THE SLICE OF THE PIE THEORY. THAT IS, I DON'T WANT TO HAVE A BAG OF MONEY TO SPLIT THREE WAYS. IT IS BASED ON THE MOST CRITICAL ISSUES FACING THE OT&E COMMUNITY AND IT ESTABLISHES A PRIORITIZED LIST OF SCHEDULED OPERATIONAL TESTS. IF YOU DON'T HAVE A REQUIREMENT RELATIVE TO THAT LIST THERE IS NO NEED TO APPLY. I DEVELOPED SPECIFIC POLICY GUIDANCE AND CLEARLY DESCRIBED THE PROCESS IN A MASTER PLAN. THERE SHOULD BE NO QUESTION IN ANYONE'S MIND WHAT IS EXPECTED FROM THE PROGRAM AND HOW IT WILL OPERATE.

ONCE A REQUEST FOR RESOURCES HAS SATISFIED THE CIP GROUND RULES IT COMPETES OPENLY WITH ALL OTHERS FOR FUNDING. MANY REQUESTS FOR RESOURCES ARE WITHDRAWN WHEN A REQUESTOR FINDS ANOTHER SERVICE ALREADY POSSESS THAT CAPABILITY AND IT IS AVAILABLE FOR USE. A LIMITATION OF TEST RESOURCES HAS BEEN RECTIFIED AND A TEST IMPROVED WITHOUT THE EXPENDITURE OF FUNDS.

ONCE THE DECISION HAS BEEN MADE TO FUND A PROJECT AND A LEAD

SERVICE HAS BEEN IDENTIFIED, WE ENTER INTO A FORMAL AGREEMENT WITH THAT SERVICE TO ENSURE THE PROGRAM IS EXECUTED .

I HAVE PROVIDED THE MECHANISM AND DISCIPLINE FOR THE SERVICES TO SEEK OUT SOLUTIONS TO OPERATIONAL TEST AND EVALUATION PROBLEMS AS A COMMUNITY. THIS REPRESENTS A DEGREE OF DISCIPLINE THEY HAVE NEVER KNOWN BEFORE. THEY RECOGNIZE THE CIP IS THE ONLY REAL ANSWER FOR OPERATIONAL TEST RESOURCES AND SUPPORT IT TO A DEGREE I HONESTLY DID NOT THINK WAS POSSIBLE.

YOU HAVE PLACED ME IN CHARGE OF INSURING CREDIBLE OPERATIONAL TESTS AND EVALUATIONS ARE CONDUCTED IN THE DEPARTMENT OF DEFENSE. I HAVE ISOLATED AND IDENTIFIED RELEVANT PROBLEMS AND CHOSEN A PRUDENT COURSE OF ACTION THAT IS SUPPORTED BY THE SERVICES. I INTEND TO CONTINUE TO PURSUE MY RESPONSIBILITIES AS EXPLAINED HERE TODAY AND REQUEST YOUR CONTINUED SUPPORT IN DOING SO. YOUR SUPPORT OF MY FY90/91 BUDGET IS IMPERATIVE IF WE ARE TO MEET THE OBJECTIVES YOU HAVE ESTABLISHED. WITHOUT A 89 PROGRAM, DISCUSSION OF THE YEARS BEYOND CANNOT BE FRUITFUL. I REQUEST THIS COMMITTEE TO DIRECT THE RELEASE OF THE FY89 APPROPRIATION.

DOT&E OPERATING BUDGET

THE DOT&E OPERATING BUDGET IS PROGRAM ELEMENT 0605118D, DIRECTOR OF OPERATIONAL TEST AND EVALUATION. THE TOTAL REQUESTED FOR FY 1990 is $25.7 MILLION AND FOR FY 1991 is $26.7 MILLION. WITH HALF OF THESE FUNDS I PERFORM OVERSIGHT ACTIVITIES ON MORE THAN 175 PROGRAMS. REVIEW OF THESE PROGRAMS BEGINS WITH THEIR DESIGNATION AS MAJOR DEFENSE ACQUISTION OR SPECIAL INTEREST PROGRAMS, CONTINUES THROUGH EARLY ACQUISTION MILESTONES AND THE BEYOND-LRIP PRODUCTION DECISIONS. THIS PORTION OF MY BUDGET PRIMARILY FUNDS CONTRACTED TECHNICAL AND ANALYTICAL ASSISTANCE NEEDED TO SUPPORT SPECIFIC PROGRAM AND TESTING CAPABILITY OVERSIGHT ACTIVITIES INCLUDING AN AGRESSIVE PROGRAM OF ON-SITE REVIEWS AND OBSERVATIONS OF OT&E PROGRESS.

IN RESPONSE TO THE CONFERENCE REPORT ON THE FY 1989 DOD AUTHORIZATION ACT WHICH EMPHASIZED MY RESPONSIBILITIES TO "... PROVIDE TIMELY ASSESSMENTS NECESSARY TO SUPPORT MILESTONE DECISIONS" ON THE STRATEGIC DEFENSE SYSTEM, I HAVE BEGUN AN INITIATIVE WHICH WOULD FACILITATE THE CONDUCT OF EARLY OPERATIONAL ASSESSMENTS FOR THIS PROGRAM. WITHIN MY ORGANIZATION I HAVE IDENTIFIED A DEPUTY DIRECTOR RESPONSIBLE FOR STRATEGIC OFFENSE, DEFENSE, AND SPACE SYSTEMS.

WHILE THIS DEPUTY FOR STRATEGIC SYSTEMS ACTIVELY PURSUES OT&E OVERSIGHT OF ALL MAJOR STRATEGIC SYSTEMS, TO INCLUDE THE B-1B, B-2, MX

RAIL GARRISON, AND SMALL ICBM SYSTEMS, HE HAS ALSO BEGUN AN EFFORT TO ADDRESS OPERATIONAL ASSESSMENT AND EVALUATION CONCERNS FOR THE STRATEGIC DEFENSE SYSTEM (SDS). SINCE THE SDS IS AN OSD MANAGED PROGRAM, THE SECRETARY DETERMINED THAT THE PLANNING AND EXECUTION FOR THE REQUIRED SYSTEM LEVEL EARLY OPERATIONAL ASSESSMENT MUST ALSO REMAIN AT THE OSD LEVEL. DUE TO BUDGET CONSTRAINTS, MY ACTIVITIES ON SDS THIS YEAR HAVE BEEN LIMITED TO DEVELOPING INSTITUTIONAL RELATIONSHIPS WITH EACH SERVICE AND THEIR OPERATIONAL TEST ACTIVITIES. THIS WILL ENSURE A THOROUGH AND COMPREHENSIVE OPERATIONAL ASSESSMENT AND EVALUATION APPROACH TO THIS COMPLEX NATIONAL PROGRAM. ACTUAL EARLY OPERATIONAL ASSESSMENT ACTIVITIES WILL BEGIN IN FY 1990. IN ORDER TO MAINTAIN A TRULY INTEGRATED PROGRAM, ALL FUNDING FOR THE SERVICE OPERATIONAL TEST AGENCIES' AND DOT&E SDS ACTIVITIES HAS BEEN CONSOLIDATED WITHIN THIS DOT&E PROGRAM ELEMENT. CONSISTENT WITH THE MEMORANDUM OF UNDERSTANDING WE HAVE WITH THE SERVICES, FUNDING WILL BE DISTRIBUTED TO EACH SERVICE OPERATIONAL TEST AGENCY TO EXECUTE ACCORDING TO OUR OVERALL SYSTEMS OPERATIONAL ASSESSMENT APPROACH. THIS CONSOLIDATED FUNDING ACCOUNTS FOR THE INCREASE IN MY FY1990, FY1991 BUDGET, AND REPRESENTS THE SECOND HALF OF THE EFFORT IN THIS PROGRAM ELEMENT.

I NEED YOUR SUPPORT FOR THE RELEASE OF FY89 FUNDS, AND FOR THE FY90/91 BUDGET. ONLY THEN WILL WE MEET THE OBJECTIVE SET BY THE CONGRESS AND SUPPORTED BY THE SECRETARY OF DEFENSE TO GIVE OUR SOLDIERS, SAILORS, AIRMEN AND MARINES WEAPON SYSTEMS AND EQUIPMENT THAT ARE EFFECTIVE AND SUITABLE.

CONTRACTS AWARDED TO C^{3}P, INC.

Mr. HEFNER. Under your CIP program, several sole source contracts have been awarded to a company named Combat Core Certification Professionals. The committee has some serious concerns about those contracts. One contract, valued at $4.5 million, involved the purchase of threat aircraft, including MiG–15's, MiG–17's, and MiG–21's and Mi–8 helicopters. These aircraft were first fielded between 1947 and 1961, and ———.

Now, we don't mean to be facetious, but on the face of it, this looks like something that you go to a flea market for. This looks like a total waste of money. Look at what you are buying. What are we procuring?

Mr. KRINGS. $4.5 million is still a lot of money.

Mr. HEFNER. We talk here about $300 billion for a weapon system. I agree everything is relative, but when I look at the list of what we bought here, I know it is a lot of money. It is a lot of money if you waste it.

Mr. KRINGS. Yes, sir. I think that the motivation, a lot of the motivation was to save money, that is why I requested the $4.5 million. This is the reason that we entered in to buying that equipment and the method by which we bought it. We entered into it because of the test requirements that had been expressed by the Services in many of the tests we had personally been involved in and overseen.

The availability of aircraft to provide targets, both targets to shoot at and targets to clutter up radars, et cetera, had been serious weaknesses in prior testing in the Sergeant York tests, line of sight and FAD, so there was a need expressed by the Services in the testing we observed. There was a need for more aircraft to participate in the tests, first.

Secondly, the only place we could increase that was by relying on the Air Force or Navy to provide this aircraft to do this. The problem we ran into was that their limitation had been reached in a number of tests and we had to go out and purchase this capability from private enterprise and we had airplanes like the T–33's. F–86's, et cetera, show up at these various tests to provide the targets for this testing.

The cost of operation was such that we believed that by using older Soviet aircraft as opposed to older U.S. aircraft, we could literally save money, number one, in the operation, provide that capability to the Services to do the tests as they wanted and should be doing them and it provided a very low cost potential for drones for live-firing when the aircraft time was used up. The actual operational cost of those airplanes is significantly less than that which we were paying for the current targets. It looked like an opportunity to save money, get realistic targets and do it on a private enterprise basis.

When we went to the private enterprise basis to do it, the only persons, the contracting people we had working for us, found was one company, at that time, in the United States that had the FAA license to operate and maintain these aircraft. So the sole source

was only to get it started to use somebody who could legally operate the airplanes, safely and efficiently, and determine whether or not, in fact, this capability would enhance testing.

If it would, then we would go on to better activities in the future and we would compete it if there was anybody else who could possibly compete. We did not intend for them to sole source forever, but there was no other way we knew of and the people who contracted for us knew of to do it at that time.

Mr. HEFNER. Who asked you to buy these particular aircraft?

Mr. KRINGS. We made that decision. We, as the testers, decided that there was inadequate testing being done. We said, it is our responsibility to insure that testing is done adequately.

Mr. HEFNER. But you said the Services had the need. Did they request that you buy these?

Mr. KRINGS. They did not request that we buy these aircraft, no, sir, they did not.

Mr. HEFNER. These aircraft have to be modified to become drones?

Mr. KRINGS. That is correct.

Mr. HEFNER. Have any been modified?

Mr. KRINGS. No.

Mr. HEFNER. Have they been tested?

Mr. KRINGS. No, sir, they have not been flown because the 1989 funds have been held up.

Mr. HEFNER. Have they been tested as drones?

Mr. KRINGS. We have to modify them physically on the ground first, obviously. They have to be man rated and tested in flight with a pilot there to insure that the ground directions, if you will, ground control, operates. We have modified an airplane, the contractors have, I have not done it. The contractors have modified an airplane and are at the point to the best of my knowledge today, able to go fly the airplane to see if, in fact, that modification will accomplish what needs to be done. It is the process we have followed in all drones. You could not properly call it a drone until it has flown and proven that it is a drone.

Mr. HEFNER. Mr. Wilson?

Mr. WILSON. Mr. Krings, where did the airplanes come from and what sort of arrangements did you make to buy them?

Mr. KRINGS. The airplanes are available on the open market. You or I could buy them. They are commercially available all over the United States.

Mr. WILSON. Really?

Mr. KRINGS. Absolutely. You could today without any government involvement, if you have a license to bring it into the country. I know personally of 21 MiG-21's that have less than 1,000 hours on them that could be bought for $500,000 apiece.

Mr. HEFNER. If I may interrupt.

In 1986, Mr. David Baskett of Armoflex, Inc. requested the Treasury Department to reconsider its refusal to allow importation of MiG aircraft into the United States. Treasury's response stated that they had no documentation to establish that importation of these old aircraft would be in the national interest, and their importation was otherwise prohibited by regulation.

You interceded in this matter in November 1987, writing to the State Department that "foreign military equipment, especially aircraft, are an essential component of (realistic operational) tests * * * I solicit your support in expediting the importation of foreign military aircraft by responsible firms who can support this essential Defense effort."

That doesn't necessarily jibe with "anybody can buy it".

Mr. KRINGS. I said if you had a license to bring it into this country. The key is that combat-type aircraft can be brought into this country either if it is owned and operated or at least owned by the U.S. Government. If the U.S. Government buys it, you can bring it in.

You can put it in a museum or operate it by the military. The other case is in which you get the ATF organization to give you authority to operate that airplane in this country.

There were a few bought years ago. The Alcohol, Tobacco and Fire Arms Agency said no more, which I don't think is bad. You have to prove to them that you had a non-government use for it that was in the best interest of the country.

Mr. HEFNER. That was for collectors, if I understand it.

Mr. KRINGS. Yes, and people using them in movies and air shows, things like that.

Mr. WILSON. Do they come from the Soviet Union?

Mr. KRINGS. No, the Soviets gave them up years ago. They are old airplanes. They are comparable to our F-86's.

Mr. WILSON. What countries do you buy them from or do individuals own them?

Mr. KRINGS. There are individuals who are in this business. Most of them reside in the Warsaw Pact countries but they are not in their military organizations. In other words, they do not reside there and belong to their military.

The Soviets are dumping equipment like crazy. They started some time ago. There are a lot of wealthy people who like to fly airplanes who decided, well, I cannot buy a F-86 so I will try to buy a MiG. It is a special thing. It is a small market. But the realization that the price of these airplanes and cost of operations was so low and they are such simplistic airplanes that it looked prudent. If you can buy a MiG for a couple of hundred thousand dollars, and get it droned for a couple hundred thousand dollars, you are operating for about half of what it costs to get a U.S. airplane. It may be crude, but at least the Army guy gets to shoot at the MiG instead of a F-86. We could then move it into the private sector and that would, in turn, hopefully reduce the cost. That was the basis. We need a lot of airplanes to do the operational testing well. A lot of airplanes, if they are current U.S. airplanes in our inventory, are expensive and they are taking the time from something else and they are often not available when you want them. If you are paying the guy he is available 24 hours a day. That was the whole concept. When you say who can do that, you go to the FAA and there is one ticket in the United States that will legally allow someone to do that safely. He did what he had to do to convince the FAA with equipment and people to make it legal. That is the reason for the sole source, because there was a sole source, not because we wanted them to do it anymore than anybody else.

Now we are not in a sole source market and anybody who can do that job can do it for the Services. I didn't mean the answer to be that long, but it is a little complicated.

CONTRACTING OFFICER'S TECHNICAL REPRESENTATIVE

Mr. HEFNER. I have a question I am a little uncomfortable with.

In 1988, a Colonel Bill Lacey on your staff married the secretary to the president of C³P. At that time, Colonel Lacey was the Contracting Officer's Technical Representative on C³P contracts. In this capacity, he had significant authority to influence C³P contracts.

Did this situation pose a conflict of interest, and if not, explain why not.

Mr. KRINGS. It absolutely did not. I am sure Bill would be glad to come up and explain it since he is with us. At the moment that Bill decided that this was more than a casual relationship, he said "I no longer want to be the COTR," the so-called person of significant influence. He said I will not do that anymore. He rendered a document to us that said I am removing myself from this because of any real or perceived conflict of interest. It is a witnessed document that exists. We made a mistake. We did not send that document directly to the contracting officer who did our contracts at that time. We replaced the person. We called him and said he is no longer the person. The other person who took his place, Nick Toomer, happens to be here. He called them and said I am the new COTR. Bill no longer operated in that role. We were concerned about that, obviously.

But we did not think that we should not go on with this acquisition because of that particular event, but we did whatever we thought was reasonable to remove him from any potential conflict of interest and to make it a matter of record so it would not be a casual event.

Mr. HEFNER. So was it an oversight that you did not notify the contracting officer?

Mr. KRINGS. We notified him of a change in COTR. We did not notify him in writing or send that document. The contracting officer was aware that the COTR had been changed. The COTR is the guy who looks at the technical side of requirements as opposed to the guy who is involved with the contractual part of it.

He is not involved in the legal signing of the documents. He was not involved in the contractual mechanism himself, just to insure what was done.

CONTRACTS AWARDED TO C³P, INC.

Mr. HEFNER. In 1988, you signed documents which stated that two C³P contracts should not be competed. Why was it necessary that these contracts be awarded sole source?

Mr. KRINGS. It was requested by the contracting officer that he needed justification for this sole source and I signed the document as requested by the contracting officer.

Mr. HEFNER. Now in one of these documents you state that "the contractor must have intimate current knowledge of U.S., Soviet and Third World warfighting systems and must have been involved

in maintaining and fielding similar systems. C³P has the attributes mandated to satisfy this effort."

Now, that is a pretty tall order for any company, even a large company. Were you aware that at that time C³P had only six employees and a net financial worth of 418 dollars and seventeen cents?

Mr. KRINGS. I knew that that was not the case at that point.

Mr. HEFNER. Is my information wrong?

Mr. KRINGS. Yes, sir. First, I would like to suggest, the IG has done quite an extensive investigation into this area. I think the IG came over and briefed Chairman Murtha and explained in their report——

Mr. HEFNER. Didn't the Defense Logistics Agency do this and not the Inspector General?

Mr. KRINGS. Yes, sir, they did.

Mr. HEFNER. Could you give the committee some idea what happened here? If this was not a tall order for them, explain why not.

Mr. KRINGS. By the time that particular BOA was made, it was, now I am getting in the contract stuff I don't understand too well either, it was an inquiry as to whether they could perform. They had demonstrated their capability by flying the airplanes. This inquiry was made after that which is a contract officer's prerogative to see whether or not the contractor can perform which is a natural thing to do.

Mr. HEFNER. The DLA survey was done four months before they flew the airplane, on May 23, 1988.

Mr. KRINGS. The same people who made that inquiry are the ones who executed the contract so apparently it was not significant. The contracting officer who called for the inquiry was the one who made the contract with C³P. He was the only one made aware of that information.

He did not pass it on to us. Whatever he found along with that information was adequate for him to make the contract. He made the contract. The contracting officer was the one who made the inquiry so apparently it was okay by him at the time.

When this was brought to our attention later we checked into it to see, well, if these guys only had $400, why did you make a contract?

Mr. HEFNER. How long had they been in business?

Mr. KRINGS. I don't know. But they did perform. When this was brought to our attention, we were certainly concerned, too. We found in retrospect the DLA investigation clearly did not look into the combined assets of the people in the country. I cannot tell you what they were because I don't know. But they were significant.

Mr. HEFNER. The company was so new there was basically no way to look into their finances?

Mr. KRINGS. But I think it is important for one brief second. These people were contracted with by an agency that does our contracting. They are the ones that looked into it and they are the ones that made the contract. We had no reason to believe there was any incapability.

When they came to the test, they performed quite well. After this, this information came out and we found out they were not quite so underfunded as was indicated. It is kind of a fuzzy area to

tell the truth, it is to me at least because not finding out until later and finding out differently tends to confuse the issue.

Mr. HEFNER. I will have other questions later.

Mr. Wilson.

Mr. WILSON. I have nothing new.

Mr. KRINGS. The IG report has a much more detailed, accurate report than I could give you on that matter. It has all that in it.

Mr. HEFNER. Mr. Miller.

JOINT MOBILE OPERATIONAL TEST FORCE

Mr. MILLER. We see in your statement about establishing the joint mobile operation task force to provide resources to insure realistic operational tests.

Mr. KRINGS. Yes, sir.

Mr. MILLER. What time frame do you have? Do you have people coming after you for tests who say "I want it yesterday?"

Mr. KRINGS. It is the same thing when it takes a long time to get equipment. If they said they wanted it next year and the equipment you need takes two years to get, it is as if they were asking for it yesterday, yes, sir.

Mr. MILLER. Those people who are asking, is it possible that they would be equipped to do that testing without you doing it or have they already gone down one direction and partially tested and decided that you should do it?

Mr. KRINGS. No, sir. I think I gave you a bum steer. We don't do the testing. We were finding when the test would come up there would be inadequate resources for the services to perform that test. When we looked back, we found if it takes three weeks to get that capability and we are not aware that it is not going to be there until two years, we are physically not going to get that equipment there for the test. It is beyond that. What we said was, the Army, Navy or Air Force have not planned adequately to have that equipment there and it is basically too late.

What we do now is insure that we look early, one, and two, if we can put at the test a real Soviet device instead of a simulator, we can get it there much more quickly if it is possible to buy one. In some cases, we cannot.

Mr. MILLER. You spoke of the Air Force. They have contacted you about tests, I suppose. How about the B–2 bomber, do you have anything to do with this type of thing?

Mr. KRINGS. Intimately involved.

Mr. MILLER. I would assume so. Do you give them guidance on the testing?

Mr. KRINGS. Yes, sir, more than they would like to have.

Mr. MILLER. Also the evaluating of that test, the Air Force would be evaluating and you would be evaluating, too.

Mr. KRINGS. Yes, sir, and the mechanism is such that when they propose the test, we must approve that test. So you can see we give them quite a bit of guidance. Only after we approve the test, we have to observe the test to be sure they do it the way they said they were going to do it. Then we write an independent report on what we believe is the operational capability.

We would like it to be the same as they wrote because we witness the same test, but we write an independent report to you and to the Secretary before it goes in to full rate production on what our independent view of the operational capability, not necessarily the technical performance in terms of specification requirements, but does it do the job it is supposed to do?

OT&E ORGANIZATION

Mr. MILLER. You are an arm of the government such as OTA would be with the legislative body who makes studies.

Mr. KRINGS. I am not familiar with them. But I am an arm of the Congress as well as the Department of Defense. I work for you in this committee, as well as working for DOD.

Mr. MILLER. This is true. OTA does the same. They are an arm of the legislative body.

Mr. KRINGS. Yes, sir.

Mr. MILLER. But when it comes to instructions, who do you answer to?

Mr. KRINGS. Both to the Congress and to the Secretary of Defense.

Mr. MILLER. Do you find people, the Secretary of Defense and the Congress, who are on opposite ends of an issue?

Mr. KRINGS. No, sir, because ultimately we really work for the user. We are kind of the voice of the user, the soldier, sailor or marine to be sure he gets what the original requirement was.

So when it all comes back together, we all work for the same person, the soldier who is going out to fight. We don't find it uncomfortable in that particular case. I would say 90 percent of the time we have no argument about the goals of these pieces of equipment with respect to the Department of Defense and the Congress.

There is questions about how we do it or get there, but in the long run, there are very few disagreements between us and the Secretary and the Congress about what we are trying to do.

It is not uncomfortable.

Mr. MILLER. When the Air Force comes back with their evaluation of the test, you would have an evaluation also.

Mr. KRINGS. That is correct.

Mr. MILLER. So there you could differ?

Mr. KRINGS. Yes, we often do.

Mr. MILLER. If a decision maker is standing here saying we go this direction or that direction, the Air Force plus yourself?

Mr. KRINGS. Yes, sir. Let's say the full rate production of a new airplane, when we present our report, we present it to the Secretary of Defense, to the Under Secretary for Acquisition and to the Congress at the same time, for all practical purposes. The results of that in many cases, if they do not warrant going in to full production, the Under Secretary of Defense for Acquisition will not permit that program to go into full rate production. There is no decision to be made by the Secretary or the Congress because the acquisition czar, if you will, has said that already. The results of testing, while very, very important in making that judgment, there are clearly other judgments.

The Congress and others may decide that the need for the weapons system, even at a less-than-totally capable system, it is more important to field it than it is to get it perfect. That is for somebody else to decide, not me.

But they need to make that decision with the best assessment of how well it works.

Mr. MILLER. Have you assessed tests that would guide the Congress or the Secretary of Defense on the MX missile and the Midgetman?

Mr. KRINGS. To a limited extent, the MX missile, not the Midgetman, clearly because it is not that mature, it is barely borne, I guess.

In terms of the MX, yes, we have. The MX has been around for a little while. We have not been around quite that long so we have not been around for the period of time to have an effect. The rail garrisoning mode, we are deeply involved and have been all through the problem quite significantly, as a result of our involvement. Some people like what we have done and some don't. We have said you cannot buy all the trains until you find out if they work and that has altered the program.

Mr. MILLER. Very good. Thank you very much.

Mr. HEFNER. Mr. Livingston.

SECURITY BREACHES

Mr. LIVINGSTON. Thank you. I have some questions that follow up on what the Chairman was asking.

On January 23, 1989, there was an article in Aviation Week and Space Technology in which you are quoted as saying that "traditionally, Soviet military equipment has been acquired by the military services and U.S. intelligence agencies through clandestine means. But such equipment is kept under tight wraps and is often unavailable for testing or training. The training people hardly see anything."

According to DOD Directive 3325.1, the Department's Foreign Materiel Program is classified "Secret". Do you believe your statement revealing that activity to be a breach of security, and if not, why not?

Mr. KRINGS. No, sir. I don't believe it was, mainly because the knowledge of the existence of this activity is such that, number one, I do not believe that the expression that they may or may not have this equipment or where it is to be a breach of security. There was no intent nor is there now nor would it be proper here to discuss where they have that equipment, what they do with it, et cetera.

There was no attempt to reveal any new information or substantiate information that might be in question. Clearly that was not the intent. In fact, quite about that same time there had been expressions by the Government when there were some inquiries as to the experiences of the Navy F-14 pilots that had recently been successful in downing a couple of MiG-23s and what their training might have been.

Mr. LIVINGSTON. So you assumed, in essence it was common knowledge, that they were selling it to us, correct?

Mr. KRINGS. There was no common knowledge as to where we got it nor were we trying to tell the public anything they didn't know about these acquisition techniques.

Mr. LIVINGSTON. We were getting it but we did not give out details and you were not expanding?

Mr. KRINGS. No, nor was I willing to do that.

Mr. LIVINGSTON. The article said you said the Chinese were willing to sell MiG–21 aircraft. Press coverage of your Mobile Integrated Threat Test in September 1988 included photographs of a Chinese-built early warning radar system bought by the DOD. Were you aware that in ——— and that in this classified document it clearly states "The fact of this Foreign Materiel Acquisition activity remains Secret"?

Mr. KRINGS. I was unaware of that. The activity in which we presented that information was completely cleared by all agencies within the Department of Defense. Everything that we did in that particular description of the equipment that we had in Albuquerque, New Mexico, and the time that we showed it to the public was cleared by public affairs, it was cleared by security. It was cleared by all the agencies that we would normally run that sort of information through within the Department of Defense. If they were, in fact, aware or unaware of this restriction, apparently it was their interpretation that this was not in conflict with that because they said what we were doing was well within the security guidelines, number one, and was, in fact, supported by the highest levels of the Department of Defense.

Mr. LIVINGSTON. The document says ———. To your knowledge, have the ——— become less inclined to provide such equipment as a result of the public disclosures? Wouldn't that be a logical action on their part, and isn't that one reason why the DOD Foreign Materiel Program is classified?

Mr. KRINGS. I personally am not aware of this, but I have spoken with General Soyster, head of the DIA, and the head of the CIA in that area to ask them about this. I personally asked them specifically if any of the activities that we have pursued had had any adverse effect on the DIA or CIA in any way, shape or form.

They said absolutely no.

Mr. LIVINGSTON. In the Washington Times dated February 6, 1989, you stated that these and similar disclosures have been sanctioned by the Office of Public Affairs. To the contrary, internal memos from OSD's Office of Public Affairs after the Aviation Week article stated the following:

> I have learned that a problem exists with OT&E running a freelance public affairs operation. In addition to complaints from our own staff, I received an absolutely irate call from DIA in the wake of the Aviation Week piece ("Who the hell cleared that article?")—not OASD/Public Affairs. We were neither consulted nor informed.
>
> Krings has a political appointee assigned to the post of Director of External Affairs. The incumbent has always had direct contact with reporters . . . someone needs to let him/her know what DOD policy is on public affairs matters as a starting point.

Evidently somebody has not sanctioned it because that seems to be an expression of unhappiness.

Mr. KRINGS. I was not aware of that, but that is not to be unexpected.

Bill Lacey, who is here with me right now, was the one who contacted them and there was—there is absolute documentation of us telling the Public Affairs people what we were doing and their clear approval of what we did.

Second, in discussions with the Secretary and the Deputy Secretary and others about this particular event, we told them explicitly what this event was, not in any innuendoes, et cetera, but very specifically what we were going to do, what we were going to do it with and what the goal was, et cetera.

It was absolutely unequivocably approved.

Mr. LIVINGSTON. Your office invited two newspaper reporters to Aberdeen, Maryland, to view a Soviet HIP helicopter, and attempted to have a CBS Evening News camera crew videotape our foreign materiel equipment and conduct an interview with yourself. The latter event was refused by the Assistant Secretary of Defense for Public Affairs. What purpose would these media events serve, and how would they further your mission of improving operational testing?

Mr. KRINGS. I think two reporters were going to write about this activity. The CBS thing, I am not familiar with, but if I had been asked I would not do that. That was not the idea, to create more publicity. I guess we were not involved in the request by any television activity, I can assure you of that. But nevertheless, two reporters who said that they were going to write pieces in both the Post and the Times about this activity wanted to have the most information they could get from the best sources as far as what we were really doing and what was going on. These were not classified aircraft. Their introduction into the country was not classified. They were bought on the open market. They were going to be used in tests in which they would never be classifed. There was nothing classified about the activity whatsoever. That is what we were trying to show them. That you can buy old Soviet helicopters that have very much the signature of many of the Soviet helicopters for very low cost and not have to spend $1 million for a fake.

Mr. LIVINGSTON. I am one here who feels we sometimes over-classify, but, in fact, some folks were concerned, because there is a memorandum from a DIA official wherein soon after the Aviation Week article it states the following:

> I spoke to a Mr. Pflock (in Mr. Krings' office) who, when I asked about the article, informed me that it was an excellent article and that it had been cleared by all involved, to include DIA. . . . I informed Mr. Pflock that it was one of the most irresponsible articles I had seen. . . . I called everyone who could remotely have cleared the article. There were no admissions.

We apparently have a difference of opinion as to whether or not it was cleared.

Mr. KRINGS. I might add also that before that period of time and since that period of time, we never entertained the press without the presence of a Public Affairs person. We do not do that unilaterally.

Mr. LIVINGSTON. Was a public affairs person present at this particular interview?

Mr. KRINGS. Yes.

Mr. LIVINGSTON. You mean there was actually somebody there from Public Affairs in the Pentagon?

Mr. KRINGS. Yes, there was an Aberdeen Public Affairs person there. Let me make one very brief statement.

Doing this causes a lot of furor because there are a lot of vested interests in keeping things classified that don't need to be classified. There is a significant amount of money made doing this. There is a significant amount of power in these particular areas, but the fact of life is that the responsibility that you have given me is to insure that these pieces of equipment that we are buying for soldiers and sailors works against the enemy they are going to have to fight. I guess I am much more concerned as long as it is legal and it is paid for to get this equipment to fight against our equipment so the people who are fully going to go into battle know what it looks like. It is incredible how little they have ever seen of equipment they should be seeing because they think some of this stuff is exotic and a bunch of it is a lot of trash. They have never seen how bad a MiG–15 or 21 is. They are lousy airplanes. If we can pump the bear up big enough we can scare everybody with it. I don't think our soldiers and sailors and marines should not have the opportunity to fight and train. This equipment is being used and sought after to train against.

We pay $30 million for a F–16 MiG—to be an aggressor when you can buy one for $500,000.

Mr. DICKS. Will you yield?

Are you declassifying information that is classified?

Mr. KRINGS. No. I don't do that. I don't think I have the right to do it, so I am not doing it. No way.

Mr. LIVINGSTON. In the Washington Times you are quoted as saying, "We didn't want to keep it hidden anymore; it costs so much to keep it secret."

Mr. KRINGS. Cap Weinberger and Will Taft and I sat down and I said, "This is my plan." They said, "That is fine." We have never done anything that was not agreed to. We have never shown the public anything that was classified. We have tried to find an acquisition process in which you don't have to classify it because everybody knows you bought it above-board. Nobody stole something or took it in the middle of the night and therefore it cannot be discussed if we have it. The acquisition process I feel certain is what the people would rather not disclose.

I can understand that. I think that is reasonable.

Mr. HEFNER. I think you have given us a reasonable response to that.

The follow-on to this is: In September 1986, you were cleared into the Thirst Watcher special access program, and agreed in writing that unauthorized disclosure or negligent handling of classified information on this program "could cause irreparable injury to the United States."

In Thirst Watcher contract documents you certified that "publicizing this effort would be detrimental to national security." Yet only a few months afterward, press releases emanated from your office and Thirst Watcher became unclassified.

What happened in such a short time to cause the complete declassification of Thirst Watcher?

Mr. KRINGS. The people who were unhappy with what we were trying to do, number one, this is pretty well covered in the IG

report. We were aware of activities at our contracting agency in Albuquerque, New Mexico that we thought were improper. We sought to change the personnel and change the way these activities were being pursued.

The people who were there were not happy about what we were doing so in retaliation they actually put together a package of information that we would consider to be sensitive, at least, if not classified, and brought that package to the press here in Washington.

That is the first time that the word "Thirst Watcher" came to the surface.

Mr. HEFNER. How did that happen?

Mr. KRINGS. They physically brought these two packages to Washington and gave them out to the press.

Mr. HEFNER. And Thirst Watcher was on there?

Mr. KRINGS. Yes. It was not a classified document but it had the words "Thirst Watcher" and "weapons acquisition". The press said we are looking to write this horrendous article about this acquisition. I said why don't we tell you what actually happened. I said, I implore you not to publish that particular document. For reasons of security. The press said, okay, we won't do it. They are not really all bad guys.

So they never published that. The potential of that particular document becoming public suggested that the name of that particular operation should be changed. So it was declassified and essentially eliminated and a new program replaced it.

Mr. LIVINGSTON. Apparently you requested access to all DOD special access acquisition programs, but your request was denied. Why was such a request made and why was it denied?

Mr. KRINGS. We asked for access to all programs in which there would be operational testing. We found programs which were near fruition and near delivery without the benefit of an operational test.

We saw programs in development and ready for fielding that had not had the benefit of an operational test. I found some of the programs when they were fielded had deficiencies that would have been discovered in an operational test. There was no problem in making the operational test secure, but in view of the fact that the program was a classified program or special access or whatever, that does not relieve us of bringing the same assurance to the serviceman who is going to use it that it will work to his satisfaction, that it will be safe for him to operate, not in the eyes of the acquirer. That was done in a lot of black programs and I found a lot of that equipment could have been infinitely better if someone independent of the acquisition process had an opportunity to see this and evaluate it.

That is the reason we said if you are going to have something go to the field we want to have an operational test. I don't care how black it is.

Everybody doesn't have to know what it is but we have to bring this discipline to all programs. As you can imagine, people had programs that did not want them to be operationally tested, did not want us to be in it. We have now come to an agreement with the department on how that will be done. They agree and we agree.

We have put the monkey on their back and said if we ever find one—we will shoot you basically. Now they bring us into the programs early enough so that we can plan.

As Mr. Miller said, if we can preclude your input into the test long enough you can be sure there is nothing to test against. We want to be there soon enough to be sure the threat equipment is there in time. It had nothing to do with security.

Mr. LIVINGSTON. Thank you.

Mr. HEFNER. Mr. Dicks.

FISCAL YEAR 1989 FUNDING

Mr. DICKS. We have held up $59 million, correct?

Mr. KRINGS. Yes.

Mr. DICKS. What would you do if you got that $59 million?

Mr. KRINGS. As a matter of fact, I can tell you exactly what it will be spent on. We have sent over all the information. I can detail it for you.

Mr. DICKS. Just in general, I want to know what the $59 million is for.

Mr. KRINGS. Fiscal year 1989, operations and support of the mobile operational test force, radars, radio and communications equipment on the ground, those items that currently reside in this movable force in fiscal year 1989, that is $15 million, spares, parts, operations and maintenance for those items. There is $4 million in there to do tests and exercise planning. We have a mechanism whereby we determine the prioritization and then we try to assign where this equipment should go in order to support the most important test. So that is what that is dominantly for. There is a device called a MOTR. It is a radar that tracts multiple objects. There is $10 million in to take advantage of a current Army acquisition in which the Army is buying some of these and we want to buy one more mobile to go wherever the test is. The Army one, unfortunately, will stay with the Army. This one is being purchased to supplement any test when done by the Army, Navy, Air Force or whatever. That is the mobile test radar. $12 million worth of instrumentation. The equipment that we buy, that anybody buys, obviously has to be instrumented. The problem, up until now, seems like every range has its own instrumentation. If you take equipment from one range and try to fly it on another, it will not communicate. This is to instrument the new equipment being bought and the old equipment. That exists to make it such that it can be taken where the test is and the test doesn't have to come where the equipment is. There is $8 million in there to acquire two Soviet helicopters that we don't have in sufficient quantity to accomplish what we want to do. There is $10 million in there to buy targets for Navy real live targets. That is the $59 million.

Mr. DICKS. This money was fenced by this committee.

Mr. KRINGS. That is correct.

Mr. DICKS. We put in some language. Do you feel you have complied with this language?

Mr. KRINGS. Absolutely.

Mr. DICKS. Would you explain that to the committee? There seems to be a problem here, at the staff level at least, that you

have not somehow complied with the committee mandate. What are the issues here?

Mr. KRINGS. I have a document that specifies the language. It is about three pages. May I have the opportunity to give that to each one?

Mr. DICKS. Sure.

Mr. KRINGS. It is so that we can focus in on the differences we might have.

My interpretation is not any better than anybody else. I am not a lawyer. It says:

> The conferees direct that none of the appropriated amount be obligated or expended until all of the following occur: A, SECDEF action. Let's look at that.
>
> Thirty days elapse after the Secretary of Defense submits a detailed description of the items to be procured or developed with these funds and a certification that similar capability is not currently in use or in development by any component of the DOD.

The Secretary sent the information on these items and also a letter from each one of the services supporting his expression of certification. That was sent and completed on the 9th of January, 1989, signed out by Will Taft, the Deputy Secretary.

> And (B) the Comptroller General of the United States conducts a review of the jurisdiction and mission of the Office of Director, Operational Test and Evaluation, including a review of the legislative intent for this office, and certifies to the House and Senate Committees on Appropriations that the OT&E Capability Improvement Program either is within the scope of that mission or would be more appropriately conducted by another organization within the DOD.

In our discussions with the GAO, one, they requested a legal opinion by the DOD counsel and the DOD wrote on two occasions that their opinion was that it was clearly within the jurisdiction and the legislative intent of the Congress that we could do this activity. It doesn't specify doing this activity, but it clearly did not have language that would preclude us from doing that activity.

Mr. DICKS. Do you have that in writing?

Mr. KRINGS. Yes, sir. It has been sent to the GAO twice.

Mr. DICKS. Have they made their findings?

Mr. KRINGS. They told us——

Mr. DICKS. Have they put it in writing?

Mr. KRINGS. I don't know. I cannot testify that they have told us that and I think they have told the committee, I don't know how many or who on the committee. In fact, they were in the office yesterday or the day before and they said "absolutely," they agree that legally that we are not precluded from doing this activity.

Mr. AUCOIN. Have they certified to this committee? In the language here, the language says he must certify.

Mr. KRINGS. I don't know whether he has or not. No, sir.

Mr. AUCOIN. That is the issue.

Mr. KRINGS. If he hasn't and he has told us that that is true, I guess I would ask why he hasn't. This determination was made quite some time ago, not just recently.

Mr. AUCOIN. We could ask why you have gone ahead in the absence of——

Mr. KRINGS. We have not gone ahead. We are not going ahead. I might also add, he conducts the review of the jurisdiction and mission.

In the letter from the Secretary of Defense, he said that this activity was clearly within our charter, and it was our mission because he gave us the mission under this charter.

Mr. DICKS. Why does the GAO Office of the General Counsel in March, 1989 say, in the second paragraph of his letter, "thus it appears that the DOTE may be moving beyond oversight and management of all OTE&E within DOD sponsoring a program for the development of operational test-related projects."

Mr. KRINGS. I am sorry, I don't understand.

Mr. DICKS. This is a letter from GAO to the General Counsel of the Department of Defense.

Mr. KRINGS. I think was his expression in his request for an opinion by the counsel. The counsel's opinion, I don't know whether you have that, too, the GAO sent that letter requesting an opinion. The counsel of DOD said it wasn't.

Mr. DICKS. You still don't have a GAO certification?

Mr. KRINGS. That is correct, yes, sir. That is correct. However, to the best of my knowledge, in discussing it with the GAO, they have indicated that they clearly do agree with the Department of Defense legal counsel that it is not prohibited from our activity.

Mr. DICKS. We will just have to wait to find that out. If that is true, why don't they write a letter to this committee?

Mr. KRINGS. What we were told, and I have to put it in that context because I never had everybody in the room at the same time to see who is doing what to whom—what we are told is they were interpreting the language to say that it wasn't either you find out if they are the right ones to do it or you find somebody else, but you find out if they are the right one to do it and see if there is anybody else who can do it better. And we clearly don't believe that was the intent of the Congress when they wrote this, or that is the way they would have written it.

It is becoming obvious that, it is being used—and this is my own personal view—that it is being used as a license to determine the quality of our management as opposed to whether it is proper for us to do it or not. And I would argue we would like to be—we don't mind being investigated about the quality of our management any day. But holding up the funds to do that doesn't seem——

Mr. DICKS. What happens now when you don't have this money?

Mr. KRINGS. The airplanes sit, radars sit, the instrumentation that is supposed to go in them is not being put in. In fact, we are losing the opportunity to use this equipment in the tests that are going to be done the next year and the end of this year.

Mr. DICKS. Because this money is not being released, you are unable to conduct what tests?

Mr. KRINGS. I can find the specific ones that we are unable to do as a result of that. It seems to me we have to get this cleared up. We strongly endorse the testing program unless there is a valid reason for doing that. That is clearly what is occurring. I would give argument about the validity of the reason. But I can assure you that is the impact.

Mr. DICKS. What tests are being conducted?

Mr. KRINGS. In order to justify the dollars that are in the fiscal year 1990 budget, the justification for them clearly expresses what this equipment will be used for and how it will be used. That is

probably the best way to show the justification for it is to be used in these tests, so we would tell you the tests they would be using.

Forward area air defense system, we have a letter coming from the Army that says that they absolutely need the equipment to do forward area air defense system tests which will be done late this summer.

ASPJ, the jammer in the F–16, et cetera; the ground radar equipment is planned to be used for those ASPJ tests. That can't be done unless the money is there to support this equipment. The Navy drone activities will be delayed as much time as it takes to get the money for those Navy drones to be used in the Navy.

Specific Navy tests, which I can find which ones they are, M–54C, Phoenix testing, close in weapon system testing, they are targets that the Navy intends to use in the testing of these F–14D. As we—we have Stinger tests going on today, this afternoon as we speak that are dependent on this equipment.

The equipment is clearly not available. There will be follow-on Stinger tests if the tests keep going on the way they were going on yesterday.

Mr. DICKS. How fast can you get this equipment? Is the equipment available right now?

Mr. KRINGS. No, sir.

We have equipment sitting that is waiting to be delivered. All of this money doesn't go to buy equipment. I don't want to make a false picture of what we are doing. Every one of these dollars couldn't be spent tomorrow and the equipment would appear. That is really not true.

Mr. DICKS. How much of it?

Mr. KRINGS. $10 million to $15 million of it. I don't want to give you the wrong impression like it is going to appear overnight. I will give you a good assessment of how much would be obligated and what we would get for it. There is one that is not only, will come right away, but it is very critical because there is a window of opportunity, if you want to call it that. That is this mobile, this multiple object tracking radar. We are trying to buy that under a good contract that the Army already has. If we don't buy it within a certain period of time, it literally goes away. We can buy it again, but certainly not with that. That would be something that would go under contract immediately and would be delivered at the scheduled time that it was to be delivered before. It would not adversely impact that money today.

Mr. DICKS. We are not buying this from the Chinese?

Mr. KRINGS. No, sir, we are buying this up in New Jersey or some place like that. This is good old American equipment.

Mr. DICKS. The bottom line is that by not getting this reprogramming approved, there are some tests that we are not getting done?

Mr. KRINGS. Yes. As Mr. Hefner talked about earlier, this drone activity, it is sitting. It is not moving.

Mr. HEFNER. Would the gentleman yield?

Mr. DICKS. I yield.

Mr. HEFNER. The real red flag that went up was over the contracting procedures. There were some concerns raised that caused these problems. I think the gentleman would agree with that.

Mr. KRINGS. Yes, sir.

Mr. HEFNER. I don't know if that has been resolved or not.

Mr. KRINGS. The IG came up and said in their view, they made a complete investigation. In their view it had been all done. I guess I would say if this had been held up and we find out those allegations were not right——

Mr. HEFNER. From my information, the IG didn't investigate. But the problems don't come from the committee not being concerned about it and being supportive of it. It comes from the questions I asked earlier. I think the gentleman will agree. We are not sure the IG has addressed the concerns that we have because of some of the people that were involved and some of the procedures that were used in acquiring these aircraft.

Mr. KRINGS. May I add one brief thing?

Mr. HEFNER. Certainly, sir.

Mr. KRINGS. Number one, of all of the acquisitions, the aircraft are only nine percent of all the acquisition. It is a small amount. We both agree a few million dollars is still a lot of money. But it is a very small part of it. It becomes a very volatile part and a very visible part. I guess what I am saying is that nearly every time that you brought up in, that was brought up by the committee, that the committee is concerned about, although the IG was not working with the direction of the committee, they clearly looked into, as far as I can see, all the concerns that you had, and they were briefed that the IG did not have concerns about it.

EFFECTIVENESS OF THREAT EQUIPMENT

Mr. HEFNER. Let me add this. My information is that the airplanes and the radar equipment amount to $59 million, and that is what the CIA has deemed to be obsolete in their report.

Mr. KRINGS. They are not obsolete—I mean they are obsolete if you are going to go to war against the Russians or the French, but they are clearly not obsolete to go test with because that is exactly what we use. Otherwise we would be saying all of our testing is obsolete. It depends obsolete, what for.

Mr. HEFNER. The program was supposed to simulate the Russian aircraft. Clearly the CIA says it does not do that. If you went to California to do an exercise, it would be like doing an exercise against World War I tanks. I am not being argumentative. We are supportive of the program, but I am trying to point out what is causing the problem. Do you agree that is where the whole thing came from where you were asked to put a hold on the money?

Mr. KRINGS. Yes. I don't think there is any other motivation.

Mr. HEFNER. It has to be resolved because we are charged with a responsibility to see that the money is spent and spent wisely. When something crops up and we get a Central Intelligence Agency report that says:

> The above equipment is not a realistic representation of the current Soviet threat that U.S. forces would face in a European air-land battle as indicated by the IOC dates which entered service in the 1950's, 1960's, and is now obsolete.

Mr. KRINGS. Sir, I could say that of every single piece of equipment that we operate against.

Mr. HEFNER. I understand that. I am just trying to figure some way we can get through this.

Mr. KRINGS. I might add this investment in old equipment to populate the sky, that clearly doesn't represent the new threat, is the biggest step we have made towards getting much newer equipment.

Mr. HEFNER. Has the gentleman from Washington finished his questions?

Mr. DICKS. Yes.

Mr. HEFNER. Mr. AuCoin.

Mr. AUCOIN. I have no questions.

ANNUAL REPORT OF DOT&E

Mr. MILLER. Mr. Chairman, if I might ask one question?

Who has the right to veto, so to speak, your report to the Secretary of Defense? It is not absolutely essential that he abide by your thought, but he can veto it; is that correct?

Mr. KRINGS. I wouldn't use the word "veto." He can add to our report his comments and views, but he can't alter the report. When you get the report, it is exactly the way we made it. He clearly should and can add other considerations to it. But nobody alters our report because it goes directly to you.

Mr. MILLER. When you speak of the report, we receive this?

Mr. KRINGS. Yes, sir.

Mr. MILLER. I don't know that I have ever seen one.

Mr. KRINGS. I happen to have one right with me, sir.

Mr. MILLER. Who are they delivered to?

Mr. KRINGS. To the four committees, to two Armed Services Committees and the two Appropriations Committees. This report—one other report I might add, besides the one that comes out on each weapon system prior to going out to full-range production, we have one that goes through all the systems. That is a document that is used by a lot of people in your business to look at the budget. It is good around budget time. We get a tremendous amount of response by somebody who looks at a line item in the budget and says it doesn't look like it is doing very well in here.

They will come to us and ask us further information. That is what we are here for. Beyond low rate initial production reports, for the last year that we have sent up here on each one of the major programs, we include in our final report so that if they didn't, they weren't involved in it during the time it actually went into production, it is there at the end of the year. That is what we were charged to do by the Congress, and that is what provide the Congress.

It can't and it shouldn't be the only judgment clearly, but it certainly is a piece of information when you all make the judgments that you do on the budget, and it is, we have been doing it for, since I have been here, three years, I guess four years.

Mr. MILLER. We probably have had 100 of those reports, and I will need to look for that one.

Mr. KRINGS. You are welcome to it.

Mr. MILLER. Thank you, Mr. Chairman.

SERVICE SUPPORT FOR THE CIP

Mr. HEFNER. Just one more question. As you know, this committee recommended zero funding for your CIP program last year. In the appeal to the committee's action written by your office, it is stated that the MOTF concept—the primary focus of the CIP program—"had full Service participation through DOD's Test and Evaluation Committee (TEC)," which you chair. The MOTF "will integrate and accommodate competing Service needs." However, only a few days after that appeal was sent, a letter was sent to you by the OSD, Army, Navy, and Air Force representatives on the TEC stating the following:

> During the Resource Panel's budget review of unfunded T&E programs, repeated requests for information on the composition and plan for MOTF were ignored. In view of the Services' current capabilities in this area, and emphasis on improved capability in Service budgets, we are concerned that the MOTF might lead to unnecessary duplication or supplant service programs with a test force which does not meet our requirements. It also appears that Congress shares our concerns. . . .

Why did you advise the Congress that your plans for the MOTF had "full Service participation" when, in fact, your office had ignored Service attempts to review and coordinate with the MOTF program?

Mr. KRINGS. There is a difference between participation and approval.

Mr. HEFNER. It is a pretty fine line.

Mr. KRINGS. In the building it isn't. The Services clearly participated in every aspect and were constantly briefed on this activity. The problem was the Services at the highest levels did not want to approve the activity because, in fact, what we were doing is we were withdrawing that capability or that responsibility and authority from the Services.

We were doing that clearly because the Service had not provided this equipment in the past. The DRB and the Secretary decided in our DRB petition that the way to ensure that this equipment would, in fact, get there, was to take some of it, a small amount of it out of the hands of the Service who had not been providing this equipment, and put it under our control and to provide it. That would not win the approval of the services. The Service who had to provide the test equipment at a much, much lower level in the testing area were very participant in this and clearly are today. That has turned completely around, and now they are very supportive of it. Even at that time when that letter came out, I can assure you that the people at least one level below those we designed that letter had been briefed. I personally witnessed when they were briefed. It was not done in a vacuum or in isolation. It was done under a rather reluctant atmosphere, but certainly not in a vacuum.

Mr. HEFNER. Any further questions?

Mr. MILLER. Everything that is purchased by DOD would need testing somewhere along the line?

Mr. KRINGS. Yes, sir.

Mr. MILLER. Whether it be a ball point pen, whether it be food. And we had the MRE's that the boys are fed. We had the Army in,

and they brought those in here to show us what it was, and that needs testing.

How far do you go on this from the SDI to the tanks, to the aircraft, down with the pens and the food that we are talking about?

Mr. KRINGS. In our oversight, not to convey the image that it is not tested, but in the oversight that we have it starts with all major acquisition programs.

Mr. MILLER. Define a major acquisition program.

Mr. KRINGS. It is a dollar amount of development and acquisition. $200 million of research and development and/or a billion dollars worth of procurement. That is a major acquisition program. All of those must go under our scrutiny. Nobody can miss that. There are two other ways to get under our scrutiny. That is the Secretary of Defense can say I want you to look at this program. We look at that program. I have the authority to say we are going to look at this program.

Clearly the last two we look at primarily if it has been the last one out of the box didn't do very well, maybe we ought to look at this one better. Sometimes the Congress is very interested in that, and we will do it as a result of congressional interest. Sometimes it is a case of indications that we get from the Service that the system isn't working well. Then we would enter. Those are the ways we get in. As you can imagine, with 30 professionals, we don't get down that ladder very far. But the Services are still obligated to do their own testing and have their own oversight of other programs. But those are the only ones we get involved in, from that level up. There are some unique programs that are designated specifically by the Congress that may or may not be in that category for us to do oversight or report on specific parts of that testing. Then that will be in addition to other ones that we have.

Mr. MILLER. Thank you.

Thank you, Mr. Chairman.

Mr. HEFNER. Are there any further questions?

ARMOFLEX, INC.

Mr. DICKS. I would like to ask one question. I want to go back to this question that was raised about David Baskett of Armoflex. What finally happened in this matter?

Mr. KRINGS. He has been in so many matters, I would have to recall.

Mr. DICKS. I guess you sent a letter requesting fast action on proposed imports by responsible firms. Were you aware that Mr. Baskett had previously been indicted for selling C–130 aircraft to Libya and that his associate had been convicted and jailed on the same charge after Mr. Baskett testified under immunity?

Mr. KRINGS. No, and I——

Mr. DICKS. Are you aware of it now?

Mr. KRINGS. I am at this very moment.

Mr. DICKS. You never heard about this before?

Mr. KRINGS. No, sir. I heard of some other escapades but not this one.

Mr. DICKS. Mr. Baskett is now a member of the board of directors of C^3. Until a few months ago Mr. Al Redick, Sr., was another

board member. Were you aware Mr. Redick was convicted in 1987 of stealing aircraft from Davis-Monthan Air Force Base and was debarred by name from receiving government contracts in July of 1988?

Mr. KRINGS. I was made aware recently that he stole aircraft parts, not whole airplanes.

Mr. HEFNER. That is a misdemeanor.

Mr. KRINGS. I think that is all it was. I think it was a couple of thousand dollars worth of parts. But I did find out that the contracting agency that we have now that when they made the contract with him——

Mr. DICKS. That is interesting.

Is it true Al Redick, Jr., is now president of the C^3 subsidiary, Aviation Classics, Ltd., and that his wife is vice president?

Mr. KRINGS. I can't attest to that.

Mr. DICKS. Does anyone know?

In 1988 a Colonel Bill Lacey of your staff——

Mr. HEFNER. We have covered that question.

Mr. DICKS. Are they happily married?

Mr. KRINGS. Ask Bill. His wife is terrified after going through all of this coming to Washington. She didn't realize others operate that way.

Mr. DICKS. Pretty wild. No further questions.

Mr. KRINGS. I didn't mean to gloss this over as something jovial. But people who deal in this business, unfortunately sometimes have unsavory backgrounds. There is no question about that. What we have tried to ensure is that in our legitimate acquisition process, we do not do anything that is illegal or wrong and try to get it as best we can. And I—nor are we up here involved in these contractual activities directly. We hope that the people who are contracting for us will know about these things and make the proper judgments and keep us aware.

We do try to keep aware. There has been a significant change in the operation down there since we found those kinds of things and other things that have been brought to our attention.

Mr. HEFNER. I think you can understand why we have been having these concerns.

Mr. KRINGS. I would just add that I think it has been thoroughly investigated. I hope you have the opportunity to see all of that.

Mr. HEFNER. Thank you.

The committee is adjourned.

Mr. Krings, thank you for coming today. We have some questions for the record which we would appreciate answers to.

[CLERK'S NOTE.—Questions submitted for the record and the answers thereto follow:]

QUESTIONABLE CONTRACTS TO C^3P, INCORPORATED

Question. Under your CIP program, several sole-source contracts have been awarded to a company named Combat Core Certification Professionals (C^3P). The Committee has some serious concerns about those contracts. One contract, valued at over $4.5 million, involved the purchase of threat aircraft including MiG–15's, MiG–17's, Mig–21's, and Mi–8 helicopters. These aircraft were first field-

ed between 1947 and 1961, and ———. This procurement looks like a waste. Why did you procure them?

Answer. We purchased these aircraft to use as targets. The Army had a requirement for fixed wing and helicopter targets for the FAAD test. Although these aircraft are old, for operational testing they are more representative of the threat than using old U.S. aircraft such as F-86 or T-33 trainers. Besides being more threat representative, they are also less costly to acquire and operate than the U.S. aircraft. Furthermore, the U.S. aircraft for use as targets are in short supply and it appeared to be cost effective to acquire these foreign aircraft. The attached memorandum for the record by Colonel James Leach, a past member of DOT&E, describes the operational test requirement that led to the procurement of these aircraft.

[CLERK'S NOTE.—The memorandum was classified "For Official Use Only," and has been retained in the Commitee's files.]

Question. In 1986, a Mr. David Baskett of Armoflex, Incorporated requested the Treasury Department to reconsider its refusal to allow importation of MiG aircraft into the United States. Treasury's response stated that they had no documentation to establish that importation of these old aircraft would be in the national interest, and their importation was otherwise prohibited by regulation. You interceded in this matter in November 1987, writing to the State Department that "foreign military equipment, especially aircraft, are an essential component of realistic operational tests . . . I solicit your support in expediting the importation of foreign military aircraft by responsible firms who can support this essential Defense effort." At the time of your letter your office had no signed contracts, or even draft statements of work, for such aircraft. Why did you intercede?

Answer. At that time we knew that we needed targets but the entire concept and procedures for acquiring equipment in support of the Capability Improvement Program was still in the development stage. We expressed our projected need for these type assets to the State Department. The Memorandum for Record by Colonel Leach, included in the answer to Question 1, explains the circumstances surrounding this event.

Question. What national interest was served by the importation of aircraft which were first fielded in 1953, and how will they contribute to realistic operational testing, as your letter claimed?

Answer. As stated in a previous answer using these aircraft as targets, rather than using U.S. F-86's or T-33 trainers, provides for more realism in operational tests at less cost.

Question. Your letter specifically requested fast action on proposed imports by "responsible firms". Were you aware that Mr. Baskett had previously been indicted for selling C-130 aircraft to Libya, and that his associate had been convicted and jailed on the same charges after Mr. Baskett testified under immunity?

Answer. At the time that letter was written, I had no knowledge of these matters.

Question. According to our S&I staff, Mr. Baskett is now a member of the Board of Directors of C^3P. Until a few months ago, a Mr. Al Redick, Sr. was another board member. Were you aware

that Mr. Redick was convicted in 1987 of stealing aircraft parts from Davis-Monthan Air Force Base, and was debarred by name from receiving government contracts in July 1988?

Answer. I was not aware of those events.

Question. Are you aware that the DOD Inspector General has recently concluded that "the debarment of Mr. Al Redick, Sr., casts doubt on the responsibility of C^3P as a contractor?"

Answer. I have received a copy of the DOD Inspector General's Report on an investigation of DTESA that I requested them to conduct. They discussed Mr. Redick, Sr.'s disbarment and that C^3P had eliminated his affiliation with the company. There was no conclusion in that report that addresses the responsibility of C^3 as a contractor. A copy of that report is attached.

[CLERK'S NOTE.—The Inspector General's report has been classified "For Official Use Only" by the Department of Defense. The report is retained in the Committee's files.]

Question. Is it true that Al Redick, Junior is now president of the C^3P subsidiary Aviation Classics, Limited and that his wife is vice-president?

Answer. I have no knowledge about Mr. Redick, Jr. or his wife being officers in Aviation Classics.

Question. In 1988, a Colonel Bill Lacey on your staff married the secretary to the President of C^3P. At that time, Colonel Lacey was the Contracting Officer's Technical Representative (COTR) on C^3P contracts. In this capacity he had significant authority to influence C^3P contracts. Did this situation pose a conflict of interest, and if not, explain why not.

Answer. It absolutely did not. In September 1988, when Colonel Lacey decided that his relationship became more than casual, he requested in writing to be relieved of duties as the COTR. We notified DTESA by phone that Colonel Lacey's name was withdrawn as the COTR and Mr. Bill Rustia's name was submitted as the new COTR. Unfortuantely, we did not follow up that phone call with a letter. Colonel Lacey's request is attached. Also attached is a copy of an October/November 1988 letter contract with C^3P showing Mr. Rustia as the COR and three DTESA personnel, Messrs. Winkle, Zezza, and Herringshaw, as the COTRs for specified tasks. Colonel Lacey was married in December 1988.

[CLERK'S NOTE.—The aforementioned contract document was classified "For Official Use Only" and is retained in the Committee's files.]

RATIONAL TEST
ND EVALUATION

OFFICE OF THE SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301-1700

29 SEP 1988

MEMORANDUM FOR DEPUTY DIRECTOR, RESOURCES & ADMINISTRATION

SUBJECT: C3P COTR Responsibilities

This letter is provided to officially advise you that I have recently become engaged to and intend to marry in December 1988 a lady who is currently an employee of C3P.

In order to avoid the perception of any conflict of interest, I hereby request that I be relived of my responsibilities as COTR on all C3P contracts.

WILLIAM J. LACEY, JR.
COLONEL USA
Military Assistant for
Land Warfare Systems

Question. In September 1988, Colonel Lacey requested that he be removed from his position on these contracts due to his impending marriage. However, no action was taken by your office. In C³P contracts dated January 5, 1989, Colonel Lacey was still shown as the COTR. Why was this situation allowed to continue?

Answer. I cannot explain why DTESA would list Colonel Lacey as COTR in documents dated in January 1989 because they were informed on numerous occasions beginning in September 1988 that Colonel Lacey was not the COTR. A Memorandum for Record by Mr. Nicholas Toomer, Colonel Lacey's superior at DOT&E, describes the notification of DTESA in September, 1988. The DTESA letter contract clearly shows DTESA personnel as the C³P COTRs with Mr. Rustia as the COR.

[CLERK'S NOTE.—The memorandum was classified "For Official Use Only". It is retained in the committee's files.]

Question. Why did you not notify your contracting authority (DTESA) of Colonel Lacey's disqualification prior to award of C³P contracts?

Answer. We did notify DTESA of Colonel Lacey being removed as COTR for C³P contracts. Unfortuantely, we did not do that in writing. That was a mistake. However, Finding "T" of the DoD Inspector General's Report, provided in response to Question 3B, substantiates the fact that DTESA knew that Colonel Lacey was not the C³P COTR.

Question. In 1988, you signed documents which stated that two C³P contracts should not be competed. Why was it necessary that these contracts be awarded sole source?

Answer. The contracting officer requested that I sign the sole source justification. I was informed by the Contracting Office that at that time there was only one company in the United States that had an FAA license to operate and maintain these aircraft. Thus, at their request, I signed the justification, The contracting officer, not DOT&E, makes the determination whether the contract will be awarded sole source. The IG report, Paragraph III.D., shows that the decision to award the C³P contract sole source was made by DTESA and C³P personnel and no DOT&E personnel were present.

Question. In one of these documents, you state that:

> The contractor must have intimate, current knowledge of U.S., Soviet, and Third World warfighting systems and must have been involved in maintaining and fielding similar systems. C³P has the attributes mandated to satisfy this effort . . .

That's a pretty tall order for any company, even a large one. Were you aware that at that time, C³P had only 6 employees and a net financial worth of only $418.47?

Answer. I did not personally investigate the details about the financial worth or size of C³P. My supporting contracting activity is charged with that responsibility. I relied on their knowledge about the capability of C³P to perform these contracts. It is my understanding that they were not so underfunded as was indicated.

Question. In May 1988, the Defense Logistics Agency (DLA) conducted a pre-award survey of C³P. They concluded the following:

> The Company Treasurer and Chief Financial Officer is currently not familiar with FAR, Part 31, on Unallowable Costs . . . There is no current formal internal safeguard system against the billing of unallowables . . .

The newness of the company and the absence of any meaningful financial information prohibits any analysis . . . no recommendation of financial capability is possible.

To date, C³P has received over $8 million from your CIP program. How much funding were they provided before they set up appropriate accounting systems, and has their current system been validated by your office?

Answer. My office is not responsible for validating the accounting system of a prospective contractor nor investigating their capability to perform a contract. This is the responsibility of the Defense Contract Audit Agency and the contract authority. Only DTESA can answer the question about how much money, if any, was provided to DTESA before their accounting system was in place.

Question. According to the Inspector General, "C³P received exceedingly favorable treatment by the DTESA through September 25, 1988 . . . The DTESA initiated extraordinary actions to assist C³P in performing on its contracts, and to support the DOT&E with flagrant disregard for the consequences of those actions." Why did DTESA, using funds from your program, favor C³P and what guidance (verbal or written) did your office provide to them concerning C³P contracts?

Answer. I do not know why DTESA favored C³P. The guidance provided by my staff was in the form of a test support requirement. DTESA advised my staff that C³P was the appropriate contractor to satisfy that requirement. Paragraph III J. of the IG Report also shows DTESA contracting and setting up a new business with Redick.

Question. Doesn't DTESA's charter state that they look to your office for funding, program management and policy guidance when supporting DOT&E—directed programs?

Answer. Yes.

Question. During that time period, was it Colonel Lacey's responsibility to provide that guidance?

Answer. Not at that time. Colonel Lacey had been replaced by Mr. Rustia, well before the C³P contract award.

POSSIBLE SECURITY COMPROMISE OF CLASSIFIED PROGRAMS

Question. Mr. Krings, in a January 23, 1989 article in "Aviation Week and Space Technology," you are quoted as saying that:

Traditionally, Soviet military equipment has been acquired by the military services and U.S. intelligence agencies through clandestine means. But such equipment is kept under tight wraps and is often unavailable for testing or training. The training people hardly see anything.

According to DoD Directive 3325.1, the Department's Foreign Material Program (FMP) is classified SECRET. Do you believe your statement revealing that activity to be a breach of security, and if not, why not?

Answer. No, I don't believe it was. The fact that the U.S. Government obtains foreign equipment for intelligence, testing, or training purposes is not classified. The detailed procedures of how these items are acquired under the foreign material program is classified. That article did not discuss classified procedures.

Question. In this same article, it states that "Krings noted that the Chinese are willing to sell MiG–21 aircraft." Press coverage of your Mobile Integrated Threat Test in September 1988 included photographs of a "Chinese-built early warning radar system" bought by the DoD. Were you aware that in ———?

Answer. I was unaware of that. The activity in which we presented that information was cleared by Public Affairs.

Question. This same document that ———. To your knowledge, have the ——— become less inclined to provide such equipment as a result of the public disclosures? Wouldn't that be a logical action on their part, and isn't that one reason why the DOD Foreign Materiel Program is classified?

Answer. I personally am not aware of this, but I have spoken with General Soyster, head of the DIA, and the head of the CIA in that area to ask them about this. I personally asked them specifically if any of the activities that we have pursued had had any adverse on the DIA or CIA in any way, shape or form. They said "absolutely no".

Question. In an interview with the Washington Times dated February 6, 1989 you stated that these and similar disclosures have been sanctioned by the Office of Public Affairs. To the contrary, internal memos from OSD's Office of Public Affairs after the "Aviation Week" article stated the following:

> I have learned that a problem exists with OT&E running a freelance public affairs operation. In addition to complaints from our own staff, I received an absolutely irate call from DIA in the wake of the Aviation Week piece ("Who the hell cleared that article?!")—not OASD/Public Affairs. We were neither consulted nor informed.
>
> Krings has a political appointee assigned to the post of Director of External Affairs. The incombent has always had direct contact with reports . . . someone needs to let him/her know what DoD policy is on public affairs matters as a starting point.

Why did you say these disclosures had been approved by Public Affairs when they had not been?

Answer. I was not aware of that internal memo. The DoD Public Affairs Office was aware of what we were doing. I also discussed the particulars with the SECDEF and Deputy SECDEF. We told them specifically what we were going to do, what we were going to do it with, and what the goal was, etc. They unequivocally approved. The official news relesase about the test that was coordinated and published by the Public Affairs Office is attached.

NEWS RELEASE

OFFICE OF ASSISTANT SECRETARY OF DEFENSE
(PUBLIC AFFAIRS)
WASHINGTON, D.C. 20301
PLEASE NOTE DATE

No. 449-88
(202) 695-0192 (Info.)
(202) 697-3189 (Copies)
(202) 697-5737 (Public/Industry)

IMMEDIATE RELEASE September 13, 1988

THREAT-FORCE CAPABILITY TO BE TESTED

Director, Operational Test and Evaluation John E. Krings announced today that a fully integrated "threat force" will be tested for the first time this month by the Defense Test and Evaluation Support Agency (DTESA) at Kirtland Air Force Base, New Mexico.

During this test, known as the Mobile Integrated Threat Test, command, control and communications (C^3) equipment from Soviet, Warsaw Pact and Third World nations will be operated together with instrumentation, data collection and support facilities to verify the Department of Defense's (DoD) capability to provide highly realistic tests of U.S. weapons systems and equipment. The test is expected to provide valuable data that will permit more effective planning for future test requirements and enhance the overall DoD test and evaluation effort.

Also being used for the first time are the assets of DoD's new Mobile Operational Test Facility, which can augment and upgrade existing test-range capabilities and be deployed into realistic combat environments.

Some of the threat-force equipment included in the test are: equipment and simulators associated with Soviet air defense systems, general C^3 equipment, Soviet fighter aircraft and large radars. The C^3 equipment will be deployed in configurations representing a key slice of a Soviet Army headquarters and division organization. Soviet aircraft will simulate close-air support missions. A-7s flown by the 188th Tactical Fighter Squadron of the 150th Tactical Fighter Group of the New Mexico Air National Guard will test the capabilities of the sensors and C^3 associated with the air defense equipment. DTESA personnel and contractors will operate and maintain the threat force equipment.

The mission of DTESA, a field activity of the Office of the Secretary of Defense and headquartered at Kirtland AFB, N.M., is to give dedicated and realistic support to DoD testers. The agency provides test expertise, essential instrumentation, and credible threat equipment, including systems actually used by potential threat forces, against which to test U.S. equipment.

A limited number of reporters will be able to view tests on September 19. To view the tests, contact George Pierce, Kirtland AFB Public Affairs, (505) 844-5991. For information on the tests, contact Jim Wilson, DTESA, (505) 842-0271.

-END-

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OFFICE OF THE SECRETARY OF DEFENSE
DOD TEST AND EVAUATION COUNCIL

8/23/88

Memo For Jan Bodanyi

Jan:

Here is an advance copy of our press release concerning the MITT test in September which I spoke with you about a couple of weeks ago.

I've also enclosed a info/background paper concerning the test. Hopefully this will help if you receive any inquiries.

I'll send you an official copy of the release and any other information you may need closer to the event.

Thanks for your help.

Karen Smitsky
DOT&E

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DRAFT PRESS RELEASE

THREAT-FORCE TEST TO BE CONDUCTED AT KIRTLAND AFB, NM

This September, a new Department of Defense "threat force" will be tested at Kirtland Air Force Base, New Mexico, by the Defense Test and Evaluation Support Agency.

The Mobile Integrated Threat Test (MITT) entails fielding, integrating, and operating multiple potential threat-force weapons systems together with the instrumentation, data collection capabilities, and support facilities necessary to permit the use of this force in highly realistic test and evaluation of United States weapon systems and equipment.

This test will also incorporate assests from the newly formed Mobile Operational Test Facility (MOTF), whose charter mandates augmenting and upgrading existing test range capabilities, in addition to its ability to be deployed into realistic combat environments. Significant cost savings will be realized as a result of the activation of MOTF.

The mission of the Defense Test and Evaluation Support Agency (DTESA) is to give dedicated and realistic support to Department of Defense testers by providing test expertise, essential instrumentation, and credible threat equipment, including systems acctually used by potential threat forces, against which to test U.S.

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The Defense Test and Evaluation Support Agency (DTESA) will conduct a systems integration capabilities test during September at Kirtland AFB, NM. The mission of DTESA is to give dedicated and realistic support to the Department of Defense Test and Evaluation process by providing test expertise, essential instrumentation and genuinely credible threat equipment to include systems actually used by potential threat forces. The main purposes of the test, known as the Mobile Integrated Threat Test, are to field, integrate, and operate multiple threat systems, instrumentation, data collection means, and support facilities planned for use in future test and evaluation missions. The test is expected to provide valuable data that will permit more effective planning for future requirements and thereby enhance the overall Department of Defense Test and Evaluation effort.

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BRIEFING: MOBILE INTEGRATED THREAT TEST (MITT)

Purpose of MITT:

- Deploy major part of Mobile Operational Test Force assets for the first time.
- Test interoperability and integration capability.
- Train personnel.
- Determine sufficiency of resources in all areas.
- Establish baseline data for future tests.

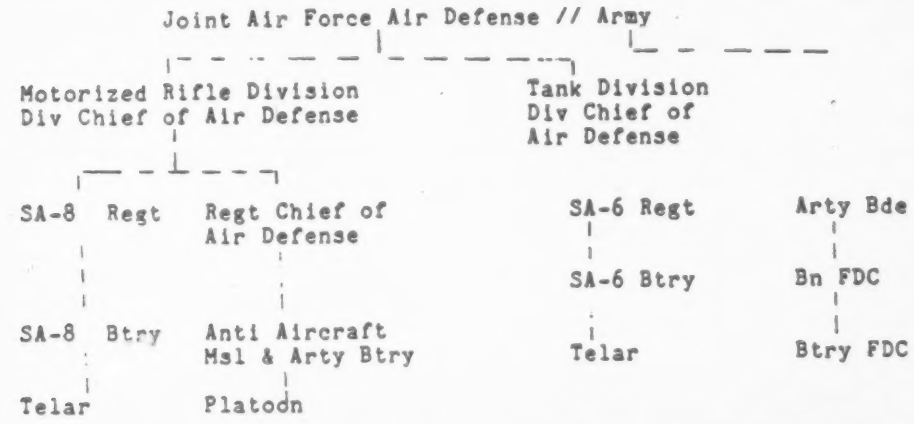
Period of MITT:

Deployment, set up and trial run.....24 Aug - 11 Sep 88
Equipment operation.....12 Sep - 30 Sep
Tear down, redeploy to storage,
repair, maintenance, site cleanup.....1 Oct - 14 Oct

Concept of MITT:

Phase 1. Deployment and setup.

- Deploy array of threat equipment, clones, simulators, and support equipment to Site Echo at Kirtland Air Force Base (KAFB), NM. Configure equipment as a Soviet Army HQ and Division Slice in the following echelon order:



- Deploy quick-look analysis equipment, and establish collection network with appropriate sensors/collectors at each principal threat node. Promulgate empirical data collection checklists and designate manual collectors for data not suitable for automated collection.

- Establish support communications.

- Establish static display of representative samples of all equipment with the exception of radars, large simulators, and principal items of data collection/analysis equipment.

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Phase 2. Test.

- Exercise all command and control nets for two hour periods, morning and afternoon, of each test day except weekends. Blue aircraft flying simulated assault sorties will cause generation of tracking and target designation data for passing to lower echelons. SAM units will simulate missile launches and report results. Scripted fire missions will be transmitted through the Artillery net. During the period 20-22 Sep, close air support missions by Soviet aircraft will be flown twice per day in addition to Blue sorties.

- Collected data following each test exercise will be transmitted or otherwise delivered to the Transportable Informtion Processing Center (TIPC) at MITT Test Control. Data will be translated to TIPC compatible form (mini VAX), analyzed, and displayed for quck-look. Test or data collection conditions revealed by TIPC quck-look to be inadequate or in error will be corrected for the next scheduled test exercise.

Phase 3. Post Test.

- Equipment will be dismantled and returned to DTESA facilities for maintenance and storage.

- Test Data will be collated and analyzed.

- A test report will be prepared.

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SECTION I - INTRODUCTION

1.0 General.

1.0.1 Purpose. The purpose of the Mobile Integrated Threat Test (MITT) is multifold. Generally the MITT will provide the Defense Test and Evaluation Support Agency (DTESA) test team an opportunity to determine the operational effectiveness and interoperability of recently acquired threat equipment working in conjunction with previously acquired and tested equipment. It will also provide a testbed capability to ensure the equipments being tested function as required in the real world tactical environment.

1.0.2 MITT Concept. Threat equipment for the test will be deployed in a "Division Slice" forward area warning configuration. Target data will be acquired by the JLP-40 early warning acquisition and tracking radar to the command and control facility for action by decision makers. Target tracking information will be visually displayed for threat analysis and assessment. Resulting command and control information will be forwarded to the Surface to Air Missile (SAM) Regiments and battery level elements. Collected data will be documented, recorded, and retained for subsequent recall, analysis, and reporting as required.

1.1 SYSTEM INFORMATION.

1.1.1 Background. The equipment being utilized during the MITT has been acquired through various methods and sources for specific utilization in Defense Test and Evaluations for multi-service customers. Each of the equipments has been thoroughly screened and determined safe for operational use. Selected personnel have been specially trained to operate and maintain the equipment at peak capacity. The equipment has been retained in original configuration to ensure realism is maintained in the threat test environment.

1.1.2 System Description. The MITT system to be tested consists of an early warning and height finder radar tracking facility, a variety of radio (C2 simulation) communications equipment, and both Red and Blue Force aircraft. Specifics of the systems to be tested are depicted in Figure 1-1. Each of the basic system test components are briefly described in the following paragraphs.

1.1.2.1 Early Warning Radar. The JLP-40 is a clone of two foreign radar systems that features co-location of two capabilities in one physical system. It is an enhanced version of both radars and provides both early warning and target acquisition information. The JLP-40 is a transportable, self-contained system housed in three trucks, one tracked vehicle, and two trailers.

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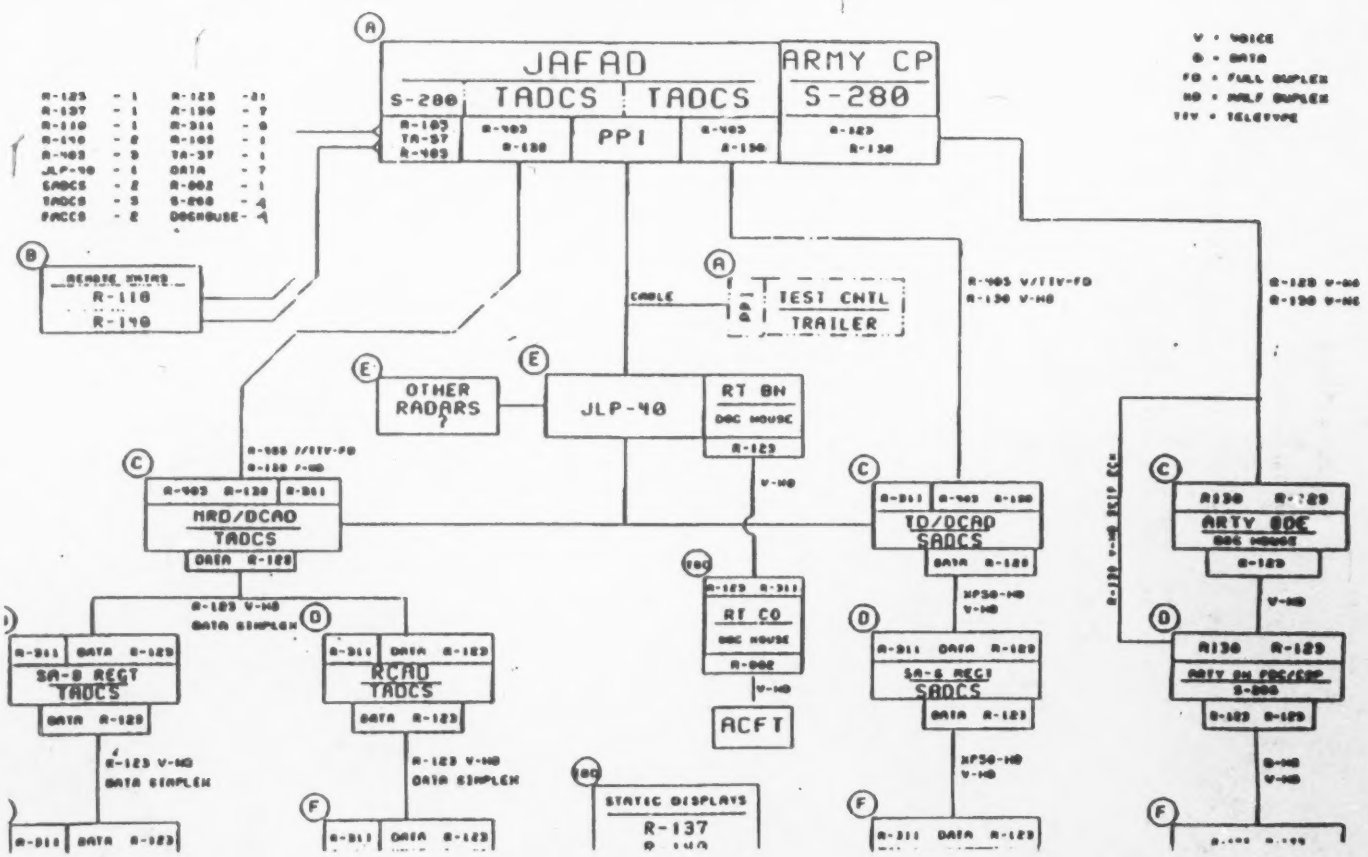
- Specific features of the JLP-40 include:
  - Three internal Plan Position Indicators (PPI) Azimuth and Range indicator


JAFAD
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TADCS
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ARMY CP
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OTHER RADARS
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MRD/DCAD
TADCS
TD/DCAD
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SA-6 REGT
SADCS
STATIC DISPLAYS
R-137

Question. Your office also invited two newspaper reporters to Aberdeen, Maryland, to view a Soviet HIP helicopter, and attempted to have a "CBS Evening News" camera crew videotape our foreign materiel equipment and conduct an interview with yourself. (The latter event was refused by the Assistant Secretary of Defense for Public Affairs). What purpose would these media events serve, and how would they further your mission of improving operational testing?

Answer. I think two reporters were going to write about this activity. I am not familiar with the CBS thing, but I would not have approved if I had been asked. The two reporters wanted the best information from an accurate source. I believe that as long as they were going to write articles, it was in the best interest of the DOD to ensure that they had accurate information. The information provided was not classified. These were not classified aircraft. Their introduction into the country was not classified. They were bought on the open market. They were going to be used in tests in which they would never be classified. There was nothing classified about the activity whatsoever. Media events in themselves do not improve operational testing; however, inaccurate information about the acquisition of foreign equipment to support operational testing would certainly have an adverse affect on our mission.

Question. A memorandum for the record from a DIA official written soon after the "Aviation Week" article states the following:

> I spoke to a Mr. Pflock (in Mr. Kring's office) who, when I asked about the article, informed me that it was an excellent article and that it had been cleared by all involved, to include DIA . . . I informed Mr. Pflock that it was one of the most irresponsible articles I had seen . . . I called everyone who could remotely have cleared the article. There were no admissions.

Given the sensitivity of this matter, why was the information not cleared in advance by the relevant intelligence agencies?

Answer. My Deputy Director OT&E for Policy, External Affairs and Special Programs coordinated all news releases about this activity with the OSD Public Affairs Office. The Public Affairs Office then executed staff coordination of the news release with DDDRE(T&E), Office of the Secretary Air Force, DIA and DTESA. Public Affairs officials from Aberdeen were present during the discussions with the news media.

Question. Soon after this article appeared, a senior official in OSD wrote in an internal memorandum:

> On the basis of multiple sources of known reliability, I have concluded that Mr. Krings is seeking political protection, support and reinforcement for the propriety of his recent public disclosures. . . . The public commentary concerning Foreign Commercial Purchasing serves to cause disruption and termination of intelligence sources. There have been some rumblings concerning ——— acquisitions although it is too early to tell what damage might have been done. The publicity has also caused claimed diminished availability with corresponding price increases. . . .

How do you respond to this?

Answer. I have no knowledge of this memorandum, nor do I have any indication of the effects described in the memorandum.

Question. In a "Washington Times" interview, you are quoted as saying:

> We didn't want to keep it hidden anymore. It costs so much to keep it secret.

In another interview you are quoted as saying:

We're trying to beat down the classified barrier.

Did you make these statements, and if so, why?

Answer. I cannot recall whether I made those exact statements but I can describe why we want acquisition of this equipment to be unclassified. This equipment needs to be used out in the open to adequately test our new systems in a realistic threat environment. Operational tests are usually large tests conducted in view of the civilian population and involve many people. It is impossible to do an adequate test where the equipment to be used in the test must be hidden. We in the U.S. treat the Stealth bomber as a highly classified item of equipment. But now that it is being tested, it has become visible and even shown to the news media. The same requirement for openness applies to the threat equipment that is used during operational testing.

Question. Will the DOD issue an unclassified DOD Directive for its FMP program before or after the classification barrier is beaten down by further media interviews, field trips, and photographs?

Answer. The procedures to acquire unclassified foreign equipment for testing are being outlined in the next revision of the DOD directive on foreign materiel acquisition and exploitation.

Question. In September 1986, you were cleared into the Thirst Watcher program, and agreed in writing that unauthorized disclosure or negligent handling of classified information on this program "could cause irreparable injury to the United States." In Thirst Watcher contract documents you certified that "publicizing this effort would be detrimental to national security." Yet only a few months afterward, press releases emanated from your office and Thirst Watcher became unclassified. What happened in such a short time to cause the complete declassification of Thirst Watcher?

Answer. Press releases from my office and Thirst Watcher declassification are totally unrelated. Some individuals, that were unhappy about the fact that we had initiated an investigation of DTESA contracting activities, put together a package of information and presented it to the press in Washington. In that package was an unmarked paper that had the words "Thirst Watcher" and "weapons acquisition." Although the press did not publish that document, the potential of that information becoming public suggested that the name of that particular operation should be changed. So Thirst Watcher was declassified and essentially eliminated and a new program replaced it.

Question. The Committee is advised that you requested access to all DOD special access acquisition programs, and that your request was denied. Why did you make such a request, and why was it denied?

Answer. We asked for access to all programs in which there would be operational testing. We found programs which were near fruition and near delivery without the benefit of an operational test.

We saw programs in development and ready for fielding that had not had the benefit of an operational test. I found some of the programs when they were fielded had deficiencies that would have been discovered in an operational test. There was no problem in

making the operational test secure, but in view of the fact that the program was a classified program or special access or whatever, that does not relieve us of bringing the same assurance to the serviceman who is going to use it that it will work to his satisfaction, and that it will be safe for him to operate. That was not done in a lot of black programs and I found a lot of that equipment could have been infinitely better if someone independent of the acquisition process had an opportunity to see this and evaluate it.

That is the reason we said if you are going to have something go to the field we want to have an operational test. I don't care how black it is.

Everybody doesn't have to know what it is but we have to bring this discipline to all programs. As you can imagine, people had programs that did not want them to be operationally tested, did not want us to be in it. We have now come to an agreement within the Department on how that will be done.

They agree and we agree. Now they bring us into the programs early enough so that we can plan.

MOBILE OPERATIONAL TEST FORCE

Question. A key element of the CIP program is the Mobile Operational Test Force (MOTF). This is described by your office as "a representative, transportable, national Red force to provide more realistic operational testing." As of January 1989, your office funded the procurement of 17 aircraft for the MOTF at a cost of $5 million. The IOC's of these threat aircraft varied from 1948 to 1966. Nine of these aircraft are of models no longer in the Soviet Union at all. How do these old aircraft contribute to a "representative, national Red force" for more realistic testing?

Answer. Currently we use old U.S. aircraft to represent Soviet aircraft in live fire operational tests. These old U.S. aircraft are in short supply and are costly to maintain and operate in operational tests. We believe that using these MiG aircraft as targets will be less costly, and will certainly be more representative of current threat aircraft than using F–4 aircraft or T–33 trainers.

Question. You are expecting deliveries this calendar year of additional equipment, valued at $35 million, which had IOC's between 1950 and 1974. Why do you continue to procure such old equipment?

Answer. We would like to procure newer equipment and indications are that the probability of doing just that are increasing. Although these older items of equipment are not the current Soviet front-line systems, these older equipments are in use in many parts of the world today and our electronic warfare equipment must still be able to recognize and defeat them as well as defeating the newer systems. So testing against them is still a valid requirement.

Question. The Committee has provided to the Central Intelligence Agency a list of the equipment you have purchased or plan to purchase. They reviewed that list and advised the Committee that ———. Why was this equipment procured when it clearly doesn't meet your own stated objectives for the MOTF program?

Answer. The answer to this question was provided in answering the previous question above.

Question. Your office awarded a contract (sole-source) to the firm C³P to develop a Master Plan for the MOTF. This firm has also provided much of the equipment to date for the MOTF. Do you find a possible conflict of interest in a case where the same contractor who provides equipment is asked to develop a plan justifying what equipment needs to be bought?

Answer. DOT&E had a requirement for a document that would outline standard operating procedures (SOP) for the conduct of maintenance and operation of the Soviet aircraft. This SOP was to be an Appendix in the Capability Improvement Program Master Plan. Since C³P was performing maintenance and were operating the equipment, it was natural that the contracting activity would contract with them to formally document the procedures being used. In writing the contract, DTESA erroneously called the product that they were to deliver a "Master Plan" rather than a SOP. They delivered a SOP and there was no conflict of interest involved.

Question. Provide a master schedule for employment of your MOTF aircraft and radar threat systems, as well as a list of U.S. programs that require their use and service documentation requesting tests against such systems.

Answer. The requested items are attached for the record.

[CLERK'S NOTE.—The above items are retained in the Committee's files.]

MOBILE INTEGRATED THREAT TEST

Question. In September 1988, DOT&E sponsored a Mobile Integrated Threat Test (MITT) to demonstrate the mobile operational test force concept. According to the S&I staff, the MITT "was little more than a DOT&E hardware display which produced little usable test data." What actual test data was obtained and how will it contribute to more realistic operational testing in the future?

Answer. The goals, objectives and results of the MITT are detailed in a 100-page final report published by DTESA. The detailed results are too lengthy to list here, but this report, numbered DTESA-TR-88-01, can be provided, if required.

Question. Apparently $190,000 was paid to C³P, Inc. to transport an aircraft to this test for display purposes. (The aircraft was not flyable). What valid purpose did this serve?

Answer. The Director, DTESA, authorized the air transportation of aircraft from Europe to Reno, Nevada and then ground transport to Albuquerque for the purpose of static display. This was not a DOT&E requirement. The $190,000 was the cost of moving the aircraft from Europe to Reno, Nevada as part of the acquisition. Only the cost of transporting the aircraft from Reno to Albuquerque, NM should be a MITT cost.

Question. What was the cost of this test?

Answer. The cost of the MITT was $2,040,071 for the period 24 August 1989 to 14 October 1989.

Question. What proportion of the assets on display at the MITT were funded by your CIP program, and what portion came from DDDRE (T&E)'s Mobile Test Facility—a facility holding previously—acquired OSD assets?

Answer. The aviation assets and some instrumentation equipments were paid for by the MITT; the remainder belonged to DDDR&E (T&E).

FULL AND CANDID REPORTING TO CONGRESS

Question. Mr. Krings, your office was established by the Congress through legislative action in 1983. As a result, there is implied a special relationship between your position and the Congress which requires full and candid reporting to Congress on operational testing matters. We have some concerns about your performance in this area.

A July 1988 GAO report concluded the following:

> With regard to the quality of DOT&E dissemination of information to the Congress, each of the official DOT&E reports to the Congress that we reviewed contained incomplete or inaccurate statements, and most contained both. In addition, the majority of DOT&E's favorable overall assessments of testing adequacy and of system effectiveness and suitability were not supported by the evidence. The omissions, inaccuracies, and overall assessments consistently resulted in a more favorable presentation to the Congress of test adequacy and system performance than was warranted by the facts.

How do you respond to the GAO's conclusion?

Answer. We disagree with that conclusion. We conduct an independent analysis of the test data obtained by the Services' operational test agencies and report them concisely and as accurately as our capability permits.

Question. According to the GAO, their point was not that your reports "never said anything negative, but that there was selectivity in the negativism." For example, during testing of the Aquila RPV in 1987, Army reports stated that their test agency "lost control of the test." In this case, the Aquila prime contractor was allowed to control the scoring conference for the operational tests, and those test scores were illegally raised. According to the DOD Inspector General, "the contractor took repeated advantage of the lack of controls." The Army test report implied a serious problem in this case. Why did you feel this not important enough as a test limitation to notify the Congress?

Answer. We have no knowledge of an Army report stating that their test agency "lost control of the test." We, and the DOD Inspector General, had observers in attendance during the Aquila testing. We both investigated concerns raised about contractor participation in the scoring conference. Our conclusion was that the contractor was in attendance and did respond to questions from Scoring Committee members on technical operation of the system. Actions by the Scoring Committee as a result of technical advice provided by the contractor were not judged to be illegal. We provided specific findings from our investigation to the Chairman of the House Armed Services Committee on 4 March 1988 and again on 20 May 1988.

[CLERK'S NOTE.—On December 14, 1987, the Department of Defense Inspector General issued a report of investigation entitled

"Irregularities in the Operational Testing of the Aquila Remotely Piloted Vehicle." The conclusions of that report were as follows:

A. Our investigation substantiated all the allegations made by the GAO.

B. The allegations of illegal contractor involvement in the conduct of the Aquila Operational Test at Foot Hood, Texas, were substantiated. There were inadequate controls to preclude the contractor from influencing the test and the contractor took repeated advantage of the lack of controls.

C. The allegations of illegal contractor involvement in the scoring of the Aquila Operational Test were substantiated. It is clear that the contractor extended his participation well beyond observer status at the scoring conferences, provided unsolicited comments, and lobbied for less damaging scores.

D. In spite of the Aquila failure of the operational test, the illegal participation of the contractor in the conduct and evaluation of the test raises questions concerning the independence and credibility of the operational test process.]

Question. By what criteria do you select which negative test results or testing limitations to report to Congress?

Answer. All significant test results and/or test limitations that are known to DOT&E are reported to Congress.

Question. As you know, this Committee recommended zero funding for your CIP program last year. In the appeal to the Committee's action written by your office, it is stated that the MOTF concept (the primary focus of the CIP program) had full service participation through DOD's Test and Evaluation Committee (TEC), which you chair. The MOTF "will integrate and accommodate competing service needs". However, only a few days after that appeal was sent, a letter was sent to you by the OSD, Army, Navy, and Air Force representatives on the TEC stating the following:

During the Resource Panel's budget review of unfunded T&E programs, repeated requests for information on the composition and plan for MOTF were ignored. In view of the Services' current capabilities in this area, and emphasis on improved capability in service budgets, we are concerned that the MOTF might lead to unnecessary duplication or supplant service programs with a test force which does not meet our requirements. It also appears that Congress shares our concerns . . .

Why did you advise the Congress that your plans for the MOTF had "full service participation" when, in fact, your office had ignored service attempts to review and coordinate with the MOTF program?

Answer. Service support for MOTF has been hot and cold. Initially they were against the program. Then in early 1988 they supported the program and submitted their requirements. It was at this time that I advised the Congress of full Service participation. Then, when the DTESA contracting officials decided that it was best to restrict information on the program to special access, the Service participation was severely limited and at that time members of the TEC became disenchanted and complained about the lack of coordination. Thus, in the fall of 1988, I revised the program, eliminating the need for special access and again obtained Service support.

Since then, the test and evaluation principals of each military department have indicated their full support of the OT&ECIP in writing. Those letters were enclosures to the SECDEF OT&ECIP letter of certification to Congress on 9 January 1989. The FY 1989 OT&ECIP budget was developed in coordination with the Services and it reflects their resource shortfalls associated with scheduled operational tests. The Tri-Service Coordinating Committee (SLINGSHOT) made the FY 1989 budget recommendations to me and its membership is derived from the Army, Navy and Air Force.

Question. Mr. Krings, in 1987 plans were begun to shift some developmental testing functions into your office. The House Armed Services Committee requested that such plans be put on hold until it could be considered by the authorizing committees. However, in an internal memorandum to Undersecretary Costello in October 1987, your deputy Mr. Karl Pflock advised the undersecretary that "we need to lay plans . . . but refrain from formal organizational changes until the conference wraps up and the conference report is written and filed". If Mr. Costello was asked about the consolidation issue, he was advised to state that the offices would probably remain separate. ("Such an answer will probably do the trick, filling the necessary square and letting the committee get on with other, more weighty matters", the memo continued.) Did you see, and approve of, this memo?

Answer. I did not see the memo prior to it becoming public, nor did I approve of the Costello memo.

Question. What was Mr. Pflock's position in your organization at that time?

Answer. Mr. Pflock's position at the time was Deputy Director for External Affairs and Special Programs.

Question. Do such statements, in your view, lead the Congress to have more confidence in the candor of your office?

Answer. No, they do not.

Question. For the record, please provide a copy of this memorandum.

Answer. The memorandum was prepared by Mr. Pflock as his recommended course of action. The DOT&E did not even see the draft prior to its publication in the news media. It was never a DOT&E official document and is not in the DOT&E files. Mr. Pflock no longer works for DOT&E and this draft reflecting his personal views should be obtained directly from him.

RELATIONSHIP WITH OSD DEVELOPMENTAL TESTING OFFICE

Question. Mr. Krings, it is written into law that your office is to be independent of all other offices and entities of the DOD responsible for research and development. In addition, by law your office is specifically excluded from any responsibility over developmental test and evaluation except the provision of advice. The DOD established the Test and Evaluation Committee (TEC) in September 1987 "to facilitate accomplishment of responsibilities and functions assigned to the Undersecretary of Defense for Acquisition in the test and evaluation area." By law, that office is responsible for developmental test and evaluation. Mr. Krings, according to the GAO General Counsel, your position as chairman of the TEC appears to give you responsibility over developmental test and evaluation, which is forbidden by Title 10, section 138, United States Code. How is your role consistent with the law?

Answer. The DOD General Counsel provided a response to the GAO General Counsel on this matter at the GAO's request. It was their opinion that there were no violations of the law.

Question. It has been stated that the current head of developmental testing in OSD, Mr. Charles Adolph, was recommended for his position by yourself, and that you took an active role in sup-

porting him for that position. What actions did you take in regard to Mr. Adolph's candidacy for his current position?

Answer. Those individuals responsible for finding qualified persons to fill high government positions asked me for any recommendations of potential candidates for that position. Mr. Adolph was among the names I provided.

Question. What was your relationship with Mr. Adolph prior to 1987?

Answer. I had met Mr. Adolph and worked with him professionally when I was a member of McDonnell Douglas and he was assigned to Edwards Air Force Base. We were not social acquaintances.

Question. The Defense Test and Evaluation Support Agency (DTESA) is a field entity of the developmental testing office in OSD. In June 1988, their charter was revised so that they would report to both you and Mr. Adolph, and the new charter was signed by both of you. However, on the organization charts, DTESA still is the official reponsibility of Mr. Adolph's office. What role did your office take in revising the DTESA charter and why?

Answer. As we were developing the concept for the Capability Improvement Program, the DDDR&E (T&E) suggested that DTESA should provide contracting and other support services in support of DOT&E. My staff worked with the DDDR&E (T&E) staff to construct a charter for DTESA that would accurately describe the type of support to be provided to both offices.

Question. When one of our Committee staff scheduled a field visit to DTESA recently, it was not one of Mr. Adolph's staff who went out to monitor these meetings, but one of your staff. If your two offices are independent, why did your staff get involved in briefings on a field activity of the developmental testing office?

Answer. It was our belief that the purpose of the visit was to discuss and obtain information on the purchase of equipment in support of the DOT&E Capability Improvement Program. I sent a member of my staff to ensure that complete information on the DOT&E requirements for that equipment would be immediately available to the Committee Staff.

Question. In the FY 1990 budget there is a new program under Mr. Adolph's sponsorship entitled the "Test and Evaluation Investment Program." Although this five-year, $1.3 billion program shows up in the budget as being under the developmental testing office, it appears to be largely under your control. For example:

It was your memorandum to the Deputy Secretary of Defense which got the program approved for the FY 1990 budget.

Management, priority-setting, and allocation of funds for the program are the responsibility of the chairman of the TEC Committee, which is you.

Fiscal oversight will be the job of Mr. Adolph's office with the full participation of the DOT&E (Mr. Krings).

Why does this program appear officially to be under Mr. Adolph's control and unofficially under your control, when your two offices are by law directed to be independent?

Answer. This program element contains the funding of the central T&E investment program. The items funded in that program are predominantly DT in nature, thus the program element is sponsored by DDDRE(T&E). Adequate DT is a prerequisite for OT so

DOT&E is naturally interested in ensuring that this program is successful. As was mentioned in answers to prior questions, DT ranges and equipment must also be made available for use in OT; thus again DOT&E has an interest in these programs.

Question. This program has been described by you as a "DOD coporate account" for service use, with your role (and that of Mr. Adolph) as "corporate bankers". If these funds are truly needed by the services, wouldn't it be more efficient for Congress to provide those funds directly to the services and cut off the corporate bankers who add another layer or bureaucratic review and control?

Answer. The Services have their individual programs to satisfy unique Service testing requirements. It is in those areas where joint requirements exist, that it is not only proper but mandatory that OSD take an active role in ensuring that equipment being purchased is compatible, interoperable, and can satisfy the needs of multi-Service use. This is not bureaucratic but a prudent exercise of oversight and control that the Congress expects from the Office of the Secretary of Defense.

Question. Wouldn't the oversight provisions of Title 10, coupled with OSD's fund control powers, give you and Mr. Adolph adequate oversight over service-funded testing programs, and if not, what changes are needed to provide that oversight?

Answer. No. The changes required to provide timely and effective oversight of the DOD operational test and evaluation community are as follows:

1. Continue to fund the Services directly for Service unique requirements.

2. Require the Services to account for all funds related to operational tests and evaluations in separate and easily identifiable program elements. No funds for the purpose of operational tests and evaluations are to remain embedded in weapon system's program manager's material command's, or any other program element not specifically designated for that purpose.

3. Funds for the purpose of operational tests and evaluations include, but are not limited to, operational costs of tests, threat systems, threat simulators, threat surrogates, threat clones, instrumentation, targets, facility improvements, interoperability, the costs of operating and maintaining the Service operational test and evaluation organizations, and general support.

4. Fence the operational test and evaluation program elements throughout DOD. Services may not reprogram funds without the approval of DOT&E and Congress dependent on established dollar thresholds.

5. Operational test and evalaution would be a separate volume of the President's budget and include all OT&E program elements throughout the DOD.

6. The Director, Operational Test and Evaluation, would be the DOD program director for operational test and evaluation. The DOT&E receives fiscal guidance from OSD for all of operational test and evaluation. The DOT&E issues fiscal year guidance to the Services for the purpose of operational test and evalution. Services submit proposed programs to the DOT&E for review, integration and approval. The DOT&E submits one DOD budget for operation-

al test and evaluation. Congress authorizes and appropriates the funds to the Services for execution.

7. The operational test and evaluation elements within the Services would not compete for funding the Service OPM process. They submit programs to the DOD program manager for operational test and evaluation. The Services are informed by OSD what fiscal guidance witll be issued and for what purposes.

8. The DOT&E has execution review and oversight authority of all DOD OT&E program elements with reprogramming authority within established dollar thresholds.

UNDERSTANDING OF FY 1989 CONGRESSIONAL RESTRICTIONS

Question. Mr. Krings, for fiscal year 1989 Congress appropriated $59 million for your CIP program, but fenced obligation or expenditure of all of those funds until each of the following occur: 30 days elapse after the Secretary of Defense submits a detailed description of the items to be procured or developed with these funds and he certifies that similar capability is not currently in use or under development by the DOD; and the Comptroller General certifies that the CIP program is within the scope of your mission and is most appropriately carried out by your organization.

Concerning the first criterion, we received a certification letter on January 9, 1989. However, the letter did not meet several requirements of the conference language. It did not certify that the CIP would not duplicate existing programs, but only that there would be no unnecessary duplication. Secondly, the detailed description of items to be procured was narrative in nature and not itemized. Thirdly, the letter was not signed by the Secretary of Defense as required. When will we see a certifiction letter which meets the conference language?

Answer. There appears to be a misunderstanding about the wording of certification that "similar capability is not currently in use or under development by the DOD." The Department interprets that as meaning that an item of equipment on the list of items being procured is not currently in use or in development. Because some items of equipment already exist, but additional quantities are required to satisfy testing capacity shortfalls, the Secretary certified that there would be no unnecessary duplication. The description of items provided in the certification was considered to be sufficiently detailed for the committee. A further breakout of subproject listing in itemized detail has been provided to the Committee Staff as back-up for the certification. The Deputy Secretary of Defense signed the certification. He is authorized to sign correspondence to the Congress for the Secretary of Defense. We believe that with this clarification of the misunderstanding about duplication, the Congress will accept the certification submitted in January 1989.

Question. Concerning the second criterion, you have been quoted in the press as stating that it is the OSD General Counsel who is to make such a certification. Are you aware that it is the General Accounting Office, and not the DOD, who is responsible for that certification?

Answer. The OSD General Counsel on two separate occasions, at the request of GAO, issued the opinion in writing that the CIP program is within the scope of my mission. I am aware that the GAO is responsible for that certification to Congress and made no such statement to the contrary.

Question. Our letter to the Department of Defense dated February 23, 1989 requested the DOD to suspend financial commitments under the CIP program until further notice. Do you understand that, notwithstanding that letter, you are prevented from obligating any FY 1989 CIP funds until the two valid certifications are received by the Congress?

Answer. Yes. We believe that DOD has satisfied its requirements and anxiously await the GAO certification that appears to be long overdue, so that critically needed test support assets can be obtained for near term operational tests.

VIEWS ON THE USE OF CONTRACTORS FOR OPERATIONAL TESTING

Question. Mr. Krings, operational testing is meant to put weapons through testing which replicates, as realistically as possible, the actual operational environment the weapons will be used in. This generally requires that such tests be conducted by the military crews who will use those weapons in combat, and not contractor personnel.

You were quoted in Congressional testimony last year as saying:

> I think it requires getting down to the nitty-gritty of what you want a contractor to do. You would like him to help you make a better judgment. If you actually don't know something and you are going to make an error as a result of that lack of knowledge, I think if I were a user I would certainly want you to go ask somebody who knows what they are talking about . . .
>
> I think the suggestion that all the people that are involved in the community of designing and developing weapon systems, will never give you an objective assessment . . . is absolutely and categorically wrong. I happened to have been in that business for many years. . . .

In your view, what is an acceptable role for contractor personnel in operational tests?

Answer. A contractor that has a vested interest in the system being tested should never be permitted to influence the data and results of that test. This does not mean that his expertise and unique knowledge about a system should not be available for use by the independent operational tester to design, execute, or evaluate the results of that test.

Question. Is there a law against contractor personnel taking part in operational tests, and if so, what is the scope of that restriction?

Answer. Yes, there is such a law. Section 2366(b)(3) of Title 10 USC states that "in the case of a major defense acquisition program, no person employed by the contractor for the system may be involved in the conduct of operational test and evaluation required under subsection (a)." Subsection (a) states that a major defense aquisition may not proceed beyond low-rate initial production until operational testing and evaluation is completed.

Question. Given your comments above, would you recommend that this law be modified to allow contractors a wider role in operational testing?

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Answer. The law should be modified to cover those instances where the operational and organizational concept for the item of equipment specifies that a contractor will provide the operation or maintenance of the equipment when it is fielded. The system must be tested under the same conditions and using the same type operators or maintenance personnel that will be used when the equipment is fielded. If contractors are going to do the work in the field, they must also do the work during the OT. The current wording of the law precludes this from happening.

[CLERK'S NOTE.—End of questions submitted for the record.]

WEDNESDAY, APRIL 26, 1989.

DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

WITNESSES

CRAIG I. FIELDS, DEPUTY DIRECTOR FOR RESEARCH
ROBERT A. MOORE, DEPUTY DIRECTOR FOR SYSTEMS AND TECHNOLOGY
CAPT. MARC PELAEZ, U.S. NAVY
RONALD CLARK, DIRECTOR NAVAL TECHNOLOGY OFFICE, DARPA

INTRODUCTION

Mr. DICKS. The committee will come to order.

We are pleased to have Craig Fields, Deputy Director for Research, DARPA and Mr. Robert Moore, Deputy Director for Systems and Technology, DARPA.

Gentlemen, your statements will be put in the record.

You may proceed if you have a short statement you would like to make.

SUMMARY STATEMENT OF MR. MOORE

Mr. MOORE. I would like to make some brief remarks pertaining to, I think, one of your primary concerns, which has to do with the Soviet threat and how we are responding to that with the guidance of Congress with our advanced submarine technology program and also the anti-submarine warfare initiative and submarine communications programs.

I think we find ourselves today in a very extraordinary situation. The Congress has initiated the advanced submarine technology program with DARPA, by requiring funding be transferred from the Navy to DARPA. The Congress—House Armed Services Committee—has established a panel of ten distinguished experts to advise that committee directly on the submarine and the anti-submarine technology. That panel has worked for a year and reported out in a hearing on the 21st of March. Earlier, Congress established specific activity dealing with anti-submarine warfare at the CIA.

I would like to suggest that the events that have led up to the situation we find ourselves in today were driven primarily by what the Soviets have done and not by lack of action on the part of the department.

SOVIET SUBMARINES

When we look at the Soviet attack submarines, we find that since our SSN-688 had its IOC in 1978, the Soviets introduced five new classes of submarines with two major upgrades. That includes the *Victor III* class, the *Sierra,* and the *Akula*. The Soviets have the fastest submarines, the highest energy density and the only

submarine with the metal cooled reactors. They have the deepest, the hardest to sink. They have the only non-magnetic hull made of titanium. Of course, the U.S. has the safest submarines and the quietest submarines. I think we have the best submarine force. The Soviet submarines are getting quieter at a faster rate. That is cause for a great concern in the future. They have a lot of older, less capable submarines that clearly are inferior to our force.

SSN–21 PROGRAM

With this capability the Soviets can pose some increasing threats both in terms of our strategic force capability and also our conventional force capability. But what should we do to counter this growing submarine threat? I think, first of all, we ought to get on with the SSN–21 program. We should accelerate the technology used to upgrade——

Mr. DICKS. When the House Armed Services Committee started this initiative, one of their staff members, who has since left the Committee, was very much against this particular program. Are you saying today that the SSN–21, in the opinion of DARPA, is a solid program and should go ahead?

Mr. MOORE. In my personal opinion, that program should move ahead.

Mr. DICKS. All right.

Mr. MOORE. The reason is it will have been 20 years since the SSN–688 was first produced and had its IOC by the time the SSN–21 has its IOC. In ten years since the SSN–688 was introduced, we have seen five new classes of Soviet submarines. I think that is the wrong ratio. I think we need to shorten the time between the new classes. Twenty years is too long.

We need to broaden the initiative, one that has a near term component to it, mid term activity and one with a far term. Our focus is to explore advanced technology for the far term to find new ways for surveillance, localization, and attack of the Soviet submarines and to take a combined arms approach and to avoid platform constraints, find a new balance of capability behind the various platforms that perform the ASW in the Navy.

DARPA has established a plan for anti-submarine warfare technology that complements the Navy's program. It works with passive acoustics, in the area of advanced active acoustics, automatic acoustics detection and classification by exploiting our computational technology. It exploits unmanned underwater vehicles to complement submarines and focuses also on automated-contact prosecution, which means the localization of submarines would kill them.

ADVANCED SUBMARINE TECHNOLOGY PROGRAM

Turning to the advanced submarine technology program, the program is well-established. We submitted three reports to Congress since the Congress established this program in the fiscal year 1988 budget. We kept the staff informed. Our objectives are to continue to improve the stealth of submarines, to improve survivability of submarines, to increase their payload, decrease their cost, seek re-

duction in manpower by exploiting automation technologies. Those are the things that we are pursuing.

The program will produce important results in the near term, as well as the long term. We are building a good relationship with the Navy, as we should have, since they are the customer for the technologies in these programs.

COMMUNICATIONS

One other program established by Congress, and that has to do with two-way aircraft to submarine communications.

This is crucially important for future submarine warfare. When we look at how anti-submarine warfare has to be conducted in the future against these quieter Soviet submarines, it is going to require more coordination than we had in the past. So this means that we have to have communications and covert communications down to the submarine.

We have to have communications backed up. We have established a joint program, as Congress has directed. Congress directed that there be a program. We worked with the Navy, and we have a joint program. We have a memorandum of agreement with them. We will demonstrate these two-way communication links in the summer of 1990. I am quite proud of the way that we have been able to work with the Navy and move out on this program.

In conclusion, I just wish personally to commend the committee for taking these initiatives in this important area.

Thank you for support of the DARPA programs.

[The biographical sketch and statement of Mr. Moore follow:]

Robert A. Moore
Defense Advanced Research Projects Agency
Deputy Director, Systems and Technology

3/87 - Present	Defense Advanced Research Projects Agency, Deputy Director for Systems and Technology. Responsible for planning, budgeting and direction of advanced technology development, demonstration and prototype development for major weapon system concepts for Tactical, Strategic, Aerospace and Maritime applications.
9/81 - 3/87	Consultant to Defense Industry and Defense Advisory Boards such as the Defense Science Board and Naval Research Advisory Committee. Directed industry and government sponsored studies and analyses to define and to assess mission area capabilities. Formed and managed two consulting companies, DSAT Inc. and Puma Corporation (acquired by Titan Systems Inc.).
9/80 - 9/81	Lockheed California Company, Advanced Development Projects ("Skunk Works") - Director of Programs. Responsible for the overall management and direction of several major classified projects.
6/77 - 9/80	Deputy Undersecretary of Defense for Research and Engineering/ Tactical Warfare Programs. Responsible for all Defense Development and Acquisition Projects in the major mission areas of Land Warfare, Air Warfare, Naval Warfare and Theater Nuclear Forces. Provided oversight and review of annual budget and defended President's budget request before Congress. Reviewed programs for readiness to enter advanced development, full scale development and production.
9/73 - 6/77	Defense Advanced Research Projects Agency. Director, Tactical Technology Office. Directed planning and management of advanced technology development and system concepts for Air Vehicles, Target Acquisition and Engagement, Advanced Weapon Concepts and Undersea Warfare.
9/72 - 9/73	Office of Director of Defense Research and Engineering/Strategic and Space Systems. Staff Specialist. Responsible for Advanced Ballistic Reentry System, Advanced ICBM Technology, Maneuvering Reentry Vehicles, Cruise Missile Guidance and SSBN Security Programs.
9/69 - 9/72	Defense Advanced Research Projects Agency, Strategic Technology Office. Division Chief for Advanced Concepts. Planned and managed projects in Strategic ASW, Nuclear Weapons Effects, Missile and Rocket Observables, University Research.

1954 - 1969	Technical/managerial positions in the Aerospace Industry engaged in development of Aircraft, Missiles, Space Propulsion and ICBM Reentry Systems.

Education

1954	B.S. in Engineering, Washington University, St. Louis, MO.
1963	M.S. in Engineering, University of Southern California, Los Angeles, CA.

NOT FOR PUBLICATION
UNTIL RELEASED BY THE COMMITTEE

STATEMENT BY

MR. ROBERT A. MOORE

DEPUTY DIRECTOR, SYSTEMS AND TECHNOLOGY

DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

BEFORE THE

HOUSE APPROPRIATIONS COMMITTEE

DEFENSE SUBCOMMITTEE

APRIL 26, 1989

Introduction

Mr. Chairman and members of the subcommittee, I appreciate the opportunity to appear before you today. I will address two extremely important undersea programs in DARPA: our Anti-Submarine Warfare (ASW) Technology Program and the Advanced Submarine Technology Program.

Our capability to detect and destroy submarines – to exert undersea control – is the subject of the ASW program, whose scope extends over sensor, weapon, and platform technologies and systems. The objective of our Advanced Submarine Technology Program is the development of innovative technologies that will enable future submarines to be more survivable and stealthy with greater firepower at reduced cost than is currently possible. It is important to recognize that these two objectives are very different. Just as submarines have important missions that go beyond ASW, ASW requires systems other than submarines.

The current DARPA budgets for these programs in FY89 are $79 million for ASW and $95 million for the Advanced Submarine Technology Program. Because of budget constraints, we were unable to include the Advanced Submarine Technology Program in the biennial FY90/91 budget, as you know.

In FY89 the Navy budget for research and development through advanced development (6.3) is about $240 million in ASW and $30 million in Submarine Technology.

The main themes of the report prepared by the House Armed Services Committee's Advisory Panel provide a reasonable framework for my remarks; namely, the Panel reported:

- Maintaining the superiority and effectiveness of our submarines is vitally important.

- Detection and defeat of quiet enemy submarines is "a matter meriting the highest priority attention."

- The ASW problem contains formidable technical challenges. Near-term improvements to current systems are needed, but to meet the predicted submarine threat, advanced technologies and new system concepts are required.

- The Navy has the ultimate responsibility for submarines and ASW. They must field the capability to meet today's commitments and future threats. DARPA must also contribute by focusing on the high-payoff, innovative technologies that are key to meeting future system needs.

I agree with these findings of the Panel and believe that our undersea technology programs are well attuned to them.

Anti-Submarine Warfare Technology Initiative

As the Panel reported, the progress of the Soviet Union in fielding advanced technology submarines poses a severe challenge to U.S. antisubmarine warfare capability. The speed, toughness, and diving ability of the Soviet Union's advanced submarines are properly of concern, but the biggest and most threatening change has been their increasing quietness. Because our present overall ASW capability relies heavily on passive acoustic detection, reduction in the acoustic signal strength of submarines translates directly into a reduction in ASW capability.

The predicted erosion of our ASW capability is a matter of strategic concern. The United States is a maritime nation; our national security requires open sea lines of communication to our allies and to our trading partners. In addition, the sea offers a medium for attack upon the United States itself, through cruise missiles launched from off our coasts or ballistic missiles launched from waters near the Soviet Union. Our national strategy requires

that we be able to prevent hostile submarines from attacking us directly, threatening our oversea commercial links, or restricting our ability to project power with our carrier battle groups.

The problem we face stems from a change in the technology of our potential adversary, not simply an increase in numbers or an improvement in tactics. The solution to this problem does not lie in only short–term improvements to our existing systems, but in long–term innovations in technology and in the development of new concepts for the employment of this technology.

The Navy has the responsibility for responding to this challenge. The Navy must field the systems, develop the operational concepts, and maintain training and readiness to contain the threat. In short, the Navy must accommodate all time frames: current operations, near–term evolutionary improvements, and adaptation of revolutionary advances in the longer term.

But DARPA has a major contribution to make as well. While maintaining good coordination and communication with the Navy, we are conducting an independent program, building on our strengths to explore advanced technology approaches that may entail more risk and may take longer to develop into deployable systems, but offer in return the chance for greater ultimate payoff.

With the aid of the best talent in the U.S., we have formulated an Initiative to respond to this challenge. I will outline the specific projects, but first let me indicate the considerations that went into our decisions as to how DARPA could best contribute.

First, there are no easy answers — no "silver bullets" in sight that will solve the problem quickly. An integrated approach is necessary for long–term success. The Navy needs systems that provide better detection, better inter–platform communications for coordinated operations, better localization and tracking, and greater lethality in attack. DARPA will pursue technological advances in all of these areas, but will focus its attention on technologies that can

be integrated in an overall systems context to achieve high-payoff results. We recognize that our primary role is to develop technology, but we will take this technology to the point that practicality and the payoff of systems based on the technology are clear.

Building on our current program, we will establish the limits of performance that can be obtained, especially from new detection concepts that are inherently resistant to Soviet submarine quieting. Our research efforts will be thorough and we will not waste time and money attempting to develop systems that are not effective and affordable.

Furthermore, we will work closely with the Navy, so that we can better understand their operational needs, and so that they are aware of the implications of our work and the opportunities it offers.

We have presented the elements of our ASW Technology Initiative to the Armed Services Committee in a report submitted in February, so I will only briefly summarize the six major areas on which we are focusing our attention.

Passive Acoustic Arrays: Even though continued Soviet submarine quieting would severely reduce the performance of our fixed detection systems, we think that large, two-dimensional arrays may "buy back" a portion of the performance that we stand to lose. Three competing industrial design teams are now working to reduce this notion to a practical design. We must determine the ocean's limits on performance and while we have not established those limits yet, we expect to demonstrate useful detection ranges even against the "very" quiet threat. We intend to explore these limits by fielding very large experimental arrays and developing advanced methods and algorithms for processing the signals. We will also investigate new engineering methods and manufacturing techniques to lower costs — a requirement for systems having thousands of elements.

Advanced Active Sonar: In principle, active sonar is not as vulnerable to submarine quieting as passive systems since it provides its own acoustic signals to "bounce" off the target. Important programs are ongoing in the Navy, but a number of signal processing concepts require additional examination. This year we have developed a new theory pertaining to ocean noise, which, if confirmed by experiment, will allow major system performance improvements. Cost effective systems will require development of technology for very powerful low-frequency active sources. We intend to work on both of these areas.

Automated Acoustic Detection: If we are to detect quiet submarines in all of the environments of interest, advanced signal processing approaches must be developed. This will require processing enormous amounts of data with completely automated processing systems. Some detection concepts will require autonomous systems that can perform the complete detection and classification process without human intervention. Developing this capability will stretch our abilities in high-throughput computers, advanced signal processing methods, and artificial intelligence. We have efforts underway in these areas for acoustic arrays that adaptively process the environmental and shipping noises, "smart" processors with neural nets to automatically detect non-traditional signals, and sonar fusion and detection automation systems.

Non-Acoustic Remote Sensing: For all of the effort that we intend to put into improved acoustic sensing methods, we cannot neglect other signals. If we can discover how to detect submarines remotely – by space-based radar, for example – then we will have a surveillance capability with entirely new characteristics that could have a substantial impact on anti-submarine warfare. We do not know yet whether such a capability is possible, but we and others are doing the research to find out. We have been working in non-acoustics jointly with the U.K. and Norway as you know, and we are close to concluding MOU's for continued cooperative efforts. DARPA

and Navy have also begun to test a new non-acoustic anti-submarine warfare system which has high potential.

Unmanned Undersea Vehicles (UUV's): Fully autonomous or remotely piloted vehicles may give us unprecedented capabilities to employ sensors and even weapons in areas where unaided submarines would face high risk. Limitations in computer capability and artificial intelligence for autonomous operations, and in power systems have prevented their use until now. Development of the necessary technology has been underway in other parts of the DARPA program and we expect to complete construction of our first prototype UUV later this year. There is a good deal of work still to be done, but we are confident that UUV's will provide a valuable asset to Navy's forces in the next decade, and we will push aggressively to develop them for specific, high-payoff applications.

Automated Contact Prosecution: Even with success in the advanced detection methods that the Navy and DARPA are working on, it seems likely that very quiet submarines may elude detection except for very short intervals. This means that we must localize and attack the target in much shorter times than is possible today. As a consequence, aerial delivery of the weapon system is almost certainly necessary and re-localization of the target at the end of the flight may have to be autonomous. We have identified concepts for doing this, and we will develop them to the point that we can demonstrate their performance. If we are successful here, then we will have the key enabling technology for a long-range weapon system that could prosecute targets detected by any of our advanced surveillance systems. This new capability would have substantial payoff in ASW, particularly in forward areas where our ASW platforms and systems have the most difficulty operating. We have started a program which, if successful, will lead to the development of torpedo warheads with improved lethality, an airborne delivery vehicle that will get them to the targets, and a localization concept deployed from a small aerial vehicle which offers substantial promise.

These six project areas are not new for us. We have been working in related areas, and these programs build on the science and technology that we have developed in high speed computing, acoustic and non-acoustic sensing, unmanned vehicles, and signal processing methods. These projects were selected with the aid and participation of the best talent available in the U.S. They offer the highest prospects for large payoff in ASW, and they are ready to be pushed hard. The ASW Technology Initiative, as presented in my report to you, describes a high-risk, high-payoff technology program which we intend to pursue at as fast a pace as available resources allow. The program will require the best efforts of talented people both in and outside DARPA, and it will require a sustained effort over an extended period of time with stable funding.

Advanced Submarine Technology Program

The Advanced Submarine Technology Program was established by the 100th Congress and it is exploring a broad range of innovative technologies to provide options for future submarines. The program is of critical importance due to the roles that submarines play in our national defense and the fact that the Soviet Union continues to demonstrate significant progress in submarine capabilities with a concomitant expansion of mission and roles. It is this Soviet progress that alarmed the HASC Advisory Panel, which recently issued their report on Submarine Technology and Anti-Submarine Warfare. The report summarized the situation with the statement:

> "Though we saw no evidence as yet that the Soviet's ambitious R&D program has produced a submarine that is qualitatively superior to ours, their continuing, ambitious technology program may well produce such a submarine unless our own R&D efforts at least match theirs in scope and productivity."

It is important to note that the Advanced Submarine Technology Program at DARPA is addressing new technology that can be useful not only in ASW, but across the full spectrum of missions that a submarine may be called upon to execute. A primary example is stealth technology, which will allow our future submarines to operate in forward, contested areas with little fear of detection.

The budget for this program was established by Congress at $113 million for FY88 and $95 million for FY89. It is proceeding according to this original plan and making excellent progress. The program now has 195 contractors, 9 universities, 3 national laboratories and 5 Navy laboratories working. As I indicated before, funding of the program in FY90 and beyond is not included in the budget request.

From the FY 1988 and FY 1989 funding we have some very beneficial near-term results that we will demonstrate to the Navy by 1991 and have initiated the ground work for significant long-term submarine design improvements.

Among the near-term results are:

- A light-weight composite propulsor that provides a 40-60% weight savings and profound reduction in magnetic signature;
- A non-hull penetrating fiber optic periscope and sensor system;
- An electro-magnetic countermeasures launcher;
- Electro-magnetic machinery bearings;
- Order-of-magnitude reduced size, high-reliability solid-state electrical transmission devices using metal oxide semi-conductor technology;

- A national caliber hydrodynamic computational facilit; at a navy laboratory;

Among the long-term results are initiatives directe toward:

- Advanced submarine electric drive that will allow u: great flexibility of design and enhanced survivability;
- Full automation to improve stealth, allow radica maneuvering, increase survivability through improve damage control, and reduce cost and size by decrease manning;
- Increased stealth through the application of a number o classified technologies.

Program Rationale

The Advanced Submarine Technology Program is addressin innovative technologies that will improve the key performanc attributes at a reduced cost. The submarine's overridin attribute is its ability to remain undetected, i.e., stealthy, durin selected portions of a mission. Following stealth, two equall important attributes are survivability in an engagement an effective payload delivery. To optimize the value of these attributes, the physical characteristics such as speed, operating depths, and acceleration must be analyzed using a systems approach and mission requirements.

Program Objectives

The objectives of the Advanced Submarine Technolog Program remain as reported to Congress in our recently submitte Long Range Plan:

- Identification and development of promising an revolutionary technology that can provide new an innovative design options for future U.S. submarines;

- Mobilization and focusing of industrial, university, and government research and development talent to significantly improve future submarine performance;

- Demonstration of advanced technologies and systems by rapid prototyping

Program Achievements

In response to an April 1988 Broad Agency Announcement, we have received and evaluated almost six hundred proposals from industry, non-profit organizations, government laboratories and universities. The total value of all proposals was over $4 billion. Only the proposals that offered the highest payoff were selected for award. The message has gotten through to industry—we are looking for innovative technology and advanced concepts even if they conflict with the "conventional wisdom." An example is magneto-hydrodynamic or MHD propulsion which may propel our future submarines silently without the need for a propellor, reduction gears or drive train.

The program has established a forum for visionaries using workshops and symposia. In addition, the program has pursued university involvement to train new engineers and scientists who have an interest in submarine development. Furthermore, university involvement is occurring through a cooperative effort with the Office of Naval Research.

Technology Timing

It is particularly important that I comment on the implications of timing and long-term commitment toward the development of future submarines. A number of enabling technologies being explored in the program, such as superconductivity, vastly improved computer power, and advanced materials may allow us to make order-of-magnitude changes in how we build, operate, and maintain submarines in the future. However, much of what we are doing today will not be available

for a decade or more. In other words, the submarine technology program is not in competition with the Navy's on–going building programs such as the improved SSN688 and the SSN21; but complementary, when viewed in the time–frame of the next twenty–five years. As I will discuss later in more detail, from a perspective of timing, it is important to establish a firm basis on which to transition technology to the Navy that is compatible with their resources and needs.

The DARPA/Navy Program Relationship

The Advanced Submarine Technology Program is consistent with our DARPA charter to pursue high–risk technology that promises high utility in military payoff and allows us to explore revolutionary technologies. Having the Advanced Submarine Technology Program at DARPA is consistent with the HASC Advisory Panel report recommendation that research on advanced submarine technology should continue in both the Navy and DARPA, and that the two should be independent in approach, but not in planning. We can be "constructively adventurous" and move out ahead of formal requirements to pursue the risky course usually shunned by others; in addition, the Program directly benefits from the synergy of other ongoing DARPA efforts in materials, superconductivity, unmanned undersea vehicles, laser communications, and advanced computer technology.

I am pleased with the degree of coordination taking place between DARPA and the Navy in this Program. The Navy's recent initiative discussed by VADM Cooper in his March 2 statement to the Seapower and Critical Materials Subcommittee to establish an integration effort for advanced submarine technology development through an advanced submarine R&D office, NAVSEA 92R, is an example of their cooperation. Adequate funding of this effort is necessary to efficiently transfer DARPA's technology developments to future systems. We intend to work closely with NAVSEA 92R to stimulate transition planning that will take advantage of what DARPA has done and smoothly fit into the

Navy's acquisition cycle. Our mutual efforts are being close–coupled to prevent "re–inventing the wheel" and to maximize our finite resources.

One of the biggest challenges for the program will be demonstrating the emerging technologies to the necessary degree that they can successfully transition to Navy programs. Projects like electric drive, submarine automation systems, composite hulls, and fuel–cell power systems are expensive to bring to fruition. The Advanced Submarine Technology Program is a mechanism to sustain these high–payoff projects that will yield improved submarine forces for the 21st Century. We appreciate the continued support of the Congress.

Conclusion

I hope I have conveyed to you the importance of both the ASW program and the Advanced Submarine Technology Program as separate but complementary elements of a DARPA Undersea Warfare Technology Program. With the support of Congress, we have made substantial progress. However, the challenges facing us in technology and resources are severe. We must make a sustained commitment to a national program, executed by both DARPA and the Navy, if the challenge of the quiet submarine threat is to be met.

Mr. HEFNER. Dr. Fields?

SUMMARY STATEMENT OF DR. FIELDS

Mr. FIELDS. I just want to say that was a topic of special interest. I guess we are both prepared to answer questions for you.

[The statement of Dr. Colladay follows:]

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Committee

DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

STATEMENT

BEFORE THE

HOUSE APPROPRIATIONS COMMITTEE

DEFENSE SUBCOMMITTEE

April 26, 1989

Statement of
Dr. Raymond S. Colladay
Director
Defense Advanced Research Projects Agency
to the
101st Congress

Mr. Chairman and Members of the Subcommittee, I appreciate the opportunity to describe DARPA's research and development program for the biennial FY1990/FY1991 budget request. I will address the program and budget issues and recent accomplishments, and establish a context by laying out our broad agency objectives, how the environment is shaping the way we approach those objectives, and what our investment strategy is for meeting those objectives.

BROAD AGENCY OBJECTIVES IN A CHANGING ENVIRONMENT

AGENCY OBJECTIVES

As its name implies, the Defense Advanced Research Projects Agency functions as the central research and development arm of the Department of Defense or, if you will, the "corporate" research organization of the Office of the Secretary of Defense, to use a private sector analogy. Our charter is to pursue high-risk technology that promises high payoff in military utility. By being willing to take risk in pursuing advanced concepts having revolutionary potential, we are able to exploit technology to gain a decisive advantage against our potential adversaries. Our technical program managers have a keen understanding of military needs and can formulate advanced concepts to meet those needs, often with an unconventional approach. In DARPA, you will not find the "school book" solution to our national defense problems. I consider that to be one of the principal advantages of having an independent organization like DARPA able to look for multiservice, sometimes revolutionary solutions -- in fact if the organization did not exist today, I think we would have to create it.

In the rapidly changing national defense environment we find ourselves in today, technological superiority will be even more important than in the past. But "high technology" alone will not be sufficient to meet the national security challenges of the next decade. Technology advances must translate into cost-effective fielded systems with enhanced capabilities and greater flexibility and

reliability than ever before. We are placing increased emphasis on cost reduction technology, particularly in microelectronics manufacturing, and on multimission platforms to meet joint-service needs. Ultimately, our technology products must be transferred to the military services, either directly for major systems or by way of industry, which is the route most of the basic, broadly applicable technology usually takes.

Without transition of its technologies and programs, there is no reason for DARPA to exist. And because of its importance, every DARPA director for the past thirty years has recognized the emphasis that must be placed on transitioning technology. Technology transition is aided by contracting through the services, which is still the principal way DARPA operates; by managing its programs with Service participation through military officers in DARPA; and by demonstrating technology in the form of prototyping systems or subsystems.

While there has been great acclaim about DARPA's impact on commercial ventures, our mission and focus is on defense. But in its role as promoter of new technology for defense, we realize DARPA's value to the United States goes beyond defense. For example, through its sponsorship of university research, DARPA supports the education of nearly half the U.S. graduate students in computer science and a large fraction of those in other key technical disciplines. Thus DARPA contributes significantly to the development of our most important resource for the future, the leaders of a workforce proficient in science and engineering. Also, technology developed by DARPA for military purposes not only strengthens defense, but often brings new technological products to the commercial market, strengthening the U.S. economy. This is particularly true of our more basic technology, like high-speed computers, electronics, and advanced materials. Since a nation's defense is ultimately tied to the productivity of its workforce and the vitality of its economy, DARPA's investment in universities and new initiatives provides a return far beyond that which is directly measurable in terms of military value.

ENVIRONMENT

The environment we face today is dominated by the reality of severely constrained defense budgets. But while budgets are reduced, the importance of advanced technology does not diminish as new demands are placed on national defense in a changing world. Our evolving and dynamic relations with the Soviet Union require that we emphasize those technologies where we have a competitive advantage to exploit their weaknesses. Much of DARPA's program -- in sensors, embedded computers, smart weapons, automation, and unmanned vehi-

cies -- lines up with this "competitive strategy". Other threats from the Soviets are also influencing our technology programs. For example, the Soviets are continuing to field land mobile strategic systems that pose very difficult technical challenges to our ability to locate and hold these targets at risk. Also, they have begun to deploy their strategic submarines in areas where our ASW and undersea surveillance capabilities are limited. The North American continent is threatened by their strategic bombers as well as sea launched cruise missiles and they continue to hold a dominating advantage in the armor and antiarmor balance compared to the U.S. and its NATO Allies.

Developing technology strategy and plans can be complicated by arms control agreements. We must understand potential force instabilities that can be created and the constraints that might be placed on some of our greatest technology "levers" and advantages. It is also important to recognize the influence that technology advances can have when appropriately demonstrated. The INF treaty and START negotiations pose new challenges to our technology for treaty verification, and a reduction in nuclear forces places increased demands on our technology aimed at improvement and modernization of conventional forces.

Outside the strategic realm and the NATO defense arena, terrorism will continue to be a serious threat and regional conflicts will potentially be a greater danger due to the proliferation of advanced weapons technology throughout the world. This threat demands that we fully exploit our technology for crisis management and control, surgical strike, low-intensity conflict, and special operations. We are working closely with the Special Operations Command to insure that our technology addresses their unique needs.

Our technological response to this changing military environment is further colored by the Nation's commercial and consumer economy, and particularly the movement off shore of critical technologies, like semiconductors. That globalization of technology, at best, may give our military adversaries equal access to the latest technology and, at worst, may give them access to superior technology or earlier access to technology than that available to U.S. defense companies for building military systems.

In planning the DARPA program, we try to develop a technology strategy for the future which is sensitive to this dynamic environment. It is important that we understand how this environment might evolve and what technologies and advanced system concepts will have the greatest payoff. On the other hand, no investment strategy is rigid, especially in DARPA. We are always prepared to

exploit opportunities that result from breakthroughs in our programs that come serendipitously.

DARPA R&D Investment Strategy

DARPA's response to these challenges and opportunities is an investment strategy which I will describe and use as a framework to tell you of our plans for the program in our budget request and to highlight some of our major accomplishments of the past year. The strategy is built around five primary thrusts. The first is to assure that we move aggressively in those technologies that have the broadest field of application, and therefore the highest leverage, in enabling advances in future weapons systems. Second is to focus on technology to reduce cost of defense. Third is to respond to major, known threats where technology can have a dramatic impact. Fourth is to exploit those particular technologies that will give us a decisive competitive advantage against the weaknesses of our adversaries. And fifth, is technology for treaty verification.

Leadership in High-Leverage Technology

Virtually every system benefits from advances in information processing and advanced materials. Our investment is guided by the belief that advances in these fields paces system development.

For nearly thirty years, DARPA's investment in information processing has provided Defense with the most advanced computing technology in the world. One current focus in our fifth generation Strategic Computing program is to push out the boundaries of parallel processing supercomputers to achieve the highest possible performance. This will make practical military applications that are simply not feasible with current technology.

In the last few years several hundred of the first wave of these new machines have been deployed, including the experimental use of one product, the Aspen computer built by AT&T, in a submarine acoustic detection application. In the next few years, we will have pushed performance to 100 billion operations per second for certain data processing applications. These remarkable advances have been accomplished through innovations in computer architecture and software, but the hardware itself has been implemented with relatively conservative microelectronics. We are now going to take the next logical step by incorporating other technology which DARPA has been pursuing in its electronics science program; namely optical interconnects between processors, dig-

ital GaAs VLSI circuits, and high-density 3-D chip packaging.

By combining advanced computer designs and the leading edge electronics being developed by our contractors, we expect to achieve performance levels of a trillion operations per second by the mid-1990s in our TeraOp program. This kind of capability will enable such applications as real-time ASW signal processing, complex fluid dynamics with turbulent and separated flow, and automated imagery analysis.

Speed is not the only performance advance we are seeking. In high density packaging, last year we were able to produce a 25 Mhz signal processor and a 9 Mbit memory in volumes 100 times less than current practice, and we expect to have a billion operation per second supercomputer packaged in 10 cubic inches next year. This work in packaging is critical if we expect to embed supercomputers in smart weapons sufficient to provide the "smarts" for the sensor fusion and data processing required for automatic target recognition. Such small embedded supercomputers are also essential for tomorrow's generation of unmanned air and underwater vehicles, for smart networks of unattended ground sensors and mines, and for many space applications where onboard processing will be mandatory if we are to avoid being flooded with a glut of data.

We are "going optical" in connecting our computer components -- in one case replacing 25,000 wires with 24 optical fibers. That has a tremendous effect on cost, power consumption, reliability, volume, and radiation hardness.

For several years we have been refining the production of digital gallium arsenide circuits. You will recall that gallium arsenide uses about 25 times less electrical power than more common circuits made from silicon, and is also 5 times faster. This makes possible even smaller and faster supercomputers. Unfortunately, our skill in manufacturing these gallium arsenide circuits lags behind silicon. Last year we achieved 10 percent yield levels with the 16K SRAM gallium arsenide and equivalent complexity chips, making it viable to include this technology in military systems. We are looking at opportunities to insert gallium arsenide into fielded military systems to upgrade performance when platforms outlast several generations of electronics technology. This is an attractive approach to upgrade performance when budgets will not allow replacement of the entire system. We have found applications in signal processing and

computing, in electronic warfare and intelligence, and communications for space based, airborne, land based, and shipborne systems.

Looking farther into the future, you may have read about the development of transistors that use quantum tunneling, and which promise 1000-time reductions in the size and power of electronic devices. We supported that work with industry to lay the groundwork for even higher performance by early in the next century.

In developing this advanced hardware, we have not neglected software. We developed the Mach operating system specifically for these kinds of machines as a successor to UNIX. Mach is now available for 9 kinds of machines and is deployed at over 150 sites. Incidentally, this is one of the few software projects that was designed, from day one, to be certifiable for classified work.

Before leaving the area of high performance computing, I want to mention our new initiative in neural networks. Many researchers have been building small neural nets that show amazing performance in learning to make discriminations and classify patterns. We are going to see just how far we can push these concepts by evaluating neural nets at a scale never before attempted. We are evaluating neural nets for automatic target recognition, sonar analysis, detection of nuclear tests in seismic signals, and speech recognition.

In addition to high performance computing, computer communication and networking is essential to the military, and DARPA is committed to developing the technology for billion bit per second (Gigabit) military networks. These will make practical the transmission of imagery of all sorts, as well as increasing military network survivability by making it possible to organize and locate our data in new ways. The first demonstrations of this technology will occur over the next two years.

DARPA has a major effort in artificial intelligence, a field that is bearing fruit after years of DARPA investment. Last year at Carnegie Mellon University, we demonstrated a system called Sphinx which sets a new world standard for performance -- a thousand-word continuous speech recognition system with 96 percent accuracy without prior training of the system to learn how to recognize the speech of a particular speaker. We demonstrated that automatic image understanding can be successfully applied to important problems in image analysis. In a joint program with the Army, we used artificial intelligence to reduce the time necessary for planning a complex military activity from the customary

24-48 hours to 2 hours, a significant tactical advantage. And in work pursued jointly with the Air Force, SAC, and JSTPS, we are applying artificial intelligence technology to greatly speed up the process of targeting our nuclear forces so as to be able to deal with mobile targets, if we can find them.

Besides information processing, our other major area of high-leverage technology investment is advanced materials. These include power sources, such as new batteries and fuel cells; structural materials like intermetallics, ceramics, and ceramic composites; optical and laser materials, and most recently manufacturing technology for high-temperature superconductors.

In ceramics, a new process for the shaping of ceramic composites was developed with support from DARPA by the Lanxide Corporation and jointly commercialized with Dupont. The effect of the process is to reduce the cost of ceramics by a factor of four, making production of ceramic composite armor for tanks and other armored vehicles practical.

In the area of high-temperature superconductors, as you know we are developing the processing and manufacturing technology for both bulk materials and thin film applications, and with special emphasis on microelectronic devices and sensors. We have made good technical progress over the last year, and we expect to help that field of endeavor through the support of several budding consortia. Our contractors established new records in critical current densities for both bulk materials and thin film materials for electronics. Over the next year or two we are on track to produce high temperature superconducting wire in mile lengths and with both the flexibility and strength for practical applications. We will also be producing our first quality SQUID magnetometers and IR sensors.

LOWERING THE COST OF DEFENSE

Over the last few years, DARPA has significantly increased its investment in manufacturing technology aimed at lowering the cost of defense, primarily emphasizing production of semiconductors, sensors, and other solid-state devices. Perhaps the most visible of those activities is the industry-government semiconductor consortium, Sematech. That project is now off on a good start. In a record 32 weeks, it has brought on line a fully operational, 48,000 foot, class-1 clean room for 0.5 micron devices. The first wafers have been produced in the factory with yields one would expect with quality contamination control.

We have a number of other semiconductor production projects developing technology that will feed into Sematech in the future. One is our work with Texas Instruments to reduce the major cost of microelectronics factory clean rooms. This is accomplished by use of vacuum modules and associated equipment that require only the small container for the microelectronics to be clean, not the whole factory. A second is our current work in x-ray lithography, the only practical technology for producing circuits with 0.25 micron or less feature size. Last year we developed new sensitive materials for x-ray lithography that can increase factory throughput by a factor of three, and we will be using that material to fabricate 0.5 micron and 0.35 micron circuits over the next two years. We are also doing work in excimer laser lithography, which promises to decrease the number of steps needed for microelectronics manufacturing by factors of four or five, thus significantly increasing yield.

Our program for developing manufacturing technology for millimeter wave and microwave monolithic integrated circuits, called MIMIC, is addressing a technology for which DoD is essentially the only customer, and a relatively small and unpredictable customer. The MIMIC program has already racked up some notable successes. A pilot line production of twelve different chip types with very promising performance is operational. In FY1990/1991, the first of two phases of the program will be completed, addressing automated testing, materials production, computer aided design and device handling, multi-chip electronics packaging, and brassboard insertion into a number of important DoD systems. MIMIC is the enabling technology for a broad range of DoD systems: transmit/receive (T/R) modules for radar systems, circuits for smart weapons and communications, wideband T/R modules for EW, receiver components for smart weapons and INEWS, to name a few areas.

Another important area we are pursuing to reduce the cost of defense is in simulation and training, where we have two programs that are making a big impact: SIMNET and Distributed Wargaming. In SIMNET, we have developed and demonstrated jointly with the Army, the technology for low bandwidth networking of a large number of low cost simulators, world-wide. Using SIMNET, large numbers of soldiers can be projected into a simulated battle in real time. We call it "artificial reality". The program has been a tremendous success and is being turned over to the Army for a major competitive procurement as the transition continues from research prototype to full development of an operational system. We are already looking at the next generation of technology by adding close air support aircraft and other weapons systems simulators to the network concept. We are also exploring the feasibility and practicality of vari-

ous levels of aggregation for realistic simulation of command and control through higher echelons.

The initial motivation for SIMNET was to provide realistic training to improve combat skills. This is increasingly important as the opportunities for training are restricted in Europe and the costs of training rise. But another use of SIMNET has arisen; namely, its use as an acquisition planning tool. We can develop low-cost simulators for equipment that does not yet exist, couple those simulators into the network, and measure the effectiveness in combat. We can modify the simulators to realistically see the effect of changes in design. And we can try out different tactics. There is no other means of evaluating the impact of new weapon systems in concert with the panoply of hardware on the battlefield. Measures of performance and effectiveness of SIMNET used in this way are still undefined, so careful assessment must be done before one draws too many conclusions about the results.

In conjunction with CINCEUR, DARPA has undertaken the development of a Distributed Wargaming prototype. Based on extensions of our computing and networking technology, the system is providing a simulated, command and staff, wartime environment for senior officer training in the art of warfighting. Under the auspices of the Warrior Preparation Center in Europe, an interactive, real-time, free play, distributed four corps wargame (more than 500 players) against an enemy-like, human opponent was conducted for the first time ever in December 1988 as a first step toward this prototype. An eight corps exercise is planned for November 1989. Air and ground commanders can work out the "game plays" that best use the talents and capabilities of their fighting organizations. By distributing the simulation through satellites, realistic training can be provided to geographically dispersed units. Equally important to DARPA, it will also permit testing of new and innovative military system concepts.

RESPOND TO MAJOR THREATS

There are six high-priority threats which have been a forcing function to concentrate DARPA resources and focus advanced technology on systems to counter these threats. The six threat areas and corresponding technology initiatives are: anti-submarine warfare, advanced aircraft countermeasures, armor/antiarmor, strategic relocatable targets, assured space assets, and low-intensity conflict.

Anti-Submarine Warfare: The Soviet submarine fleet is a severe, if not the most severe threat to U.S. tactical and strategic forces. The most troubling as-

pect of the threat is the fact that recent and expected new Soviet submarines are very quiet. The threat includes Soviet SSBNs operating in northern waters; submarines operating close to our shores with ability to launch cruise missiles; SSNs opposing safe egress of our SSBNs from port; SSGNs threatening survivability of our carrier battle groups and surface action groups from substantial standoff distances; and SSNs and SSGNs threatening the capability of our surface ships to reinforce and resupply NATO defensive forces.

As you know, we recently submitted a report, in response to a Congressional request, detailing this threat and a technology plan initiative that could have a major impact on our ASW capability in the future. As part of our ongoing ASW technology efforts, DARPA is carrying out projects in nonacoustic sensing, acoustic sensing, advanced processing, unmanned underwater vehicles, and advanced torpedo technology. In addition, the Advanced Submarine Technology Program (ASTP) and Laser Communications efforts are important contributions to our future ASW capabilities and undersea warfare. Let me highlight a few of our accomplishments of the past year.

Our nonacoustic ASW program is looking at advanced radar and optical techniques for submarine detection from aircraft or from space. A major part of this is the radar ocean imaging program, which is a combined theoretical and experimental effort to resolve technical issues related to measurement of radar scattering from surface effects. The program is investigating new measurement techniques and processing concepts that show potential for improved submarine detection capabilities. In the past year, we have successfully conducted an experiment cooperatively with Norway that showed that a particular kind of multi-frequency radar, developed by the Norwegians, can detect strong internal waves produced by surface ships. Also, we have continued our analysis of data from our 1987 Loch Linnhe experiment with the U. K., along with theoretical work that leads us to some optimism that substantial improvements in detection performance may be possible.

As a spin-off of our investigation of optical techniques for ASW, we put together a laser system to detect shallow mines in the Persian Gulf. The system, which was designed, fabricated, and successfully tested aboard a helicopter, was able to search at high rates and to detect mines at the required depths with sufficiently low false alarm rates to meet the requirements for ship avoidance of shallow mines.

In acoustic ASW, we are developing technologies for robust, cost-effective,

detection systems that will work against the difficult submarine threats of the 21st Century. Our goal to counter this new threat is to improve detection capability by a factor of 100. In order to achieve this, it is necessary to explore fully the detailed acoustic characteristics of the ocean as well as the full signature spectrum of submarines. In addition, it is essential to develop automated processing algorithms and systems and to demonstrate it all in sea trials. The major Navy effort in acoustic surveillance is at low frequency. The DARPA project focuses on mid-frequency. Our goal is to demonstrate an "ocean limited" array in FY1990 and advanced processing techniques for automated detection, classification, and localization by the end of FY1991.

This year an automated acoustic detection and recognition concept will be demonstrated in the laboratory using simulated and recorded submarine signals. An important part of the system is an acoustic detection system that uses a neural net processor. This processor was tested at sea with positive results and wide praise by the Navy. We have a long way to go before submarine sonars and undersea surveillance systems can be fully automated or, more likely, offer an intelligent assistant to the sonarman, but future ASW demands will lead to large acoustic sensor networks that will only be feasible with the expected advances in automated processing.

Our prototype unmanned underwater vehicle design was completed and fabrication is well underway, and the mission package development and system integration contract was awarded. The UUV program has two principal applications. The systems to be prototyped will employ sophisticated sensors and control systems that will significantly enhance the operational flexibility and survivability of submarine platforms in hostile environments.

The Advanced Submarine Technology Program is accelerating the development of high-payoff technologies for submarines beyond the SSN-21. The program, limited to hull, machinery and electrical applications, is focused on improving submarine stealth, survivability, and payload while maintaining affordable costs. Significant strides have been made in what must be a long-term process. The establishment of an innovative technology base and infrastructure for future submarines has only begun.

Air Countermeasures Technology: The Soviets continue to improve their aircraft and missile systems capability for their general purpose forces as well as their strategic forces. Facing the potential threat of an effective U.S. strategic defense against ICBMs and SLBMs, the Soviet Union may rely more heavily on

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strategic bomber launched cruise missiles and submarine launched cruise missiles. Although the U.S. has started an air defense initiative, our defensive capability is already heavily stressed by their offensive capability and they could make this threat much more severe should they adopt some of the more advanced technologies for their air vehicles.

We are exploring a multimission air defense missile system in the hypersonic weapon technology (HWT) program that was mentioned previously. In that program, we are integrating several technologies into a weapons concept that would provide a long range intercept capability for defense of North America, outer-air-battle defense of carrier battle groups, and defense of our strategic bombers against long range Soviet interceptors. The enabling technologies are: high-altitude, long-endurance unmanned vehicles, hypersonic vehicle technology such as the SWERVE vehicle developed and flown by Sandia National Lab, the conformal radar developed initially under DARPA's LORAINE project, and the miniature GPS guidance system based on the GPS miniaturized receiver technology developed by DARPA. This GPS receiver is a major breakthrough that will enable affordable proliferation of navigation, positioning, and guidance systems throughout the military forces.

Armor/Anti-Armor: In our Armor/Anti-Armor program, chemical energy warheads for anti-tank guided missiles (ATGM) were demonstrated to be capable of defeating the projected next generation Soviet armor. After infantry-operated, anti-tank missiles were proven so successful in the early 70's, the Soviets have developed means for upgrading the armor protection capability of their operational tanks in the field. The Soviets now pose a major challenge to NATO's ATGMs which number of the order of a hundred thousand weapons. The new warheads developed in this program can now be used to upgrade some of those anti-tank guided missiles and enable greater warhead effectiveness on new missiles. The Armor/Anti-Armor program has also made significant progress in kinetic energy projectiles, light armor, and heavy armor systems.

Advanced land combat systems have now been demonstrated to be valid and viable for future systems. Included are new survivability concepts which, when combined with advanced weapon concepts, will provide armored combat vehicles with a ten-to-one advantage over Soviet tanks projected for the early 2010's.

Strategic Relocatable Targets: The need to understand the signatures of strategic relocatable targets, especially the mobile ICBMs, is of crucial importance. We urgently need to understand the limitations of available techniques

and to see if we can develop advanced sensor and sensor processing means for extending the capabilities as required to be able to hold these mobile ICBMs at risk.

An advanced airborne radar is being used to determine the detectability of strategic relocatable targets when those targets are partially obscured by trees. These radar signatures are also augmented with selected infrared optical data. The objective of our SRT program is to identify, develop, and demonstrate sensors that can detect, classify, and provide targeting information on land mobile ICBMs and other relocatable targets.

Advanced Satellite Technology: A Defense Science Board Summer Study of 1988 has brought to the forefront the growing concern that we must assure the availability of space assets in wartime. It would be particularly attractive to provide dedicated space systems and reconstitutable capabilities for use by tactical commanders. One way to achieve that goal is to reduce the size and thus the cost of the space systems and the launch vehicles. We are promoting commercial launch vehicle development by procuring military launch services of these vehicles. Our first steps are to demonstrate available technology for space systems not heretofore available. This will hopefully be followed by the development of more advanced technologies and space system concepts and then their demonstration in space. To that end, a Broad Agency Announcement for advanced satellite technology is attracting wide-spread interest from industry and universities, and we hope to award multiple contracts to pursue some of the most promising concepts.

The PEGASUS airborne satellite launch vehicle design was completed and fabrication of the first vehicle has started. The PEGASUS vehicle will meet the low throw-weight end of our launch vehicle requirements. The airborne launch concept offers one option for a more survivable launch capability with flexibility in terms of first orbit ground track, and a more rapid response to theater space system requirements. The Standard Small Launch Vehicle (SSLV) will be developed to satisfy the payload requirements between the PEGASUS and Delta Class launch vehicles. Fabrication has also started on the lightweight satellite communications payload that will be launched this year.

Programmatically, we have signed or are negotiating agreements with all the Services to participate in the program. The Air Force will serve as primary, but not exclusive, agent. The Navy has had a long standing interest and the Army has a strong user involvement.

Special Operations and Low-Intensity Conflict: DARPA is playing a limited but growing role in the development of the special technology needed for low-intensity conflicts. In doing so we can leverage off our robust technology base in microelectronics and sensors for small, light, rugged inexpensive equipment oftentimes required in small quantities and with rapid response. We are involved in the development of the next generation of unattended ground sensors that are smart, are networked to work in teams, that combine the readings of many different kinds of sensors. We are using our microelectronics packaging technology to make systems, e.g. communications devices or beacons, that are 10 to 100 times smaller than before, and hence practical for foot soldiers. In addition, our small, high power-density battery technology, and work in compact night vision devices is also being directed towards the specific needs of the Special Operations Command (SOCOM). Final modifications are being made to the Advanced Tactical Transport experimental airplane to complete flight testing this year, and other small covert troop carrier aircraft concepts are being considered in cooperation with SOCOM.

I believe DARPA is in a unique position to provide R&D support to the Special Operations Forces by virtue of the technology programs we pursue and our streamlined mode of operation. General Lindsey and I have agreed to coordinate requirements and technology planning and a Memorandum of Understanding between DARPA and SOCOM is in final review that will formalize the agreement.

EXPLOIT TECHNOLOGY TO GAIN A MAJOR COMPETITIVE ADVANTAGE

Throughout most of its history, DARPA has been a driving force in pursuing technology in high-speed computers, microelectronics, sensors, automation, and unmanned vehicles, where we have a competitive advantage in exploiting the weaknesses of our adversaries. The "Competitive Strategies" plan may be new in form, but in substance, DARPA has been there all along. In common with this strategic thrust is the body of technology DARPA is pursuing aimed at improving manpower effectiveness and reducing casualties on the battlefield; namely, automation and "smart" systems, advanced sensors, unmanned platforms for air and underwater applications, and smart mines.

Over the past 15 years, DARPA has pioneered the development of mini- RPVs, now called Unmanned Air Vehicles (UAVs), for target acquisition, target designation, and target attack (e.g., air defense suppression). We reported last year the successful endurance demonstration with the AMBER (UAV) and the transition of this program to the UAV Joint Program Office (JPO). Because of budget-

ary limitations in the JPO, AMBER is in jeopardy. We decided to provide additional support to ensure successful transition.

We are now evaluating the Boeing Company CONDOR UAV development. CONDOR is a large, High Altitude Long Endurance (HALE) drone that can perform many reconnaissance, surveillance, target acquisition, and other C3 missions for the maritime forces, strategic forces, tactical forces over the friendly side of the battlefield, and for continental air defense (ADI). Boeing has had three successful flights with this fully autonomous aircraft and the results signal a new era in military aviation.

Just as in the case of UAVs, DARPA has pursued the platform, guidance, and sensor technology for Unmanned Underwater Vehicles (UUVs). As mentioned previously, a prototype UUV is currently under development for undersea warfare applications.

The Pilot's Associate program is applying artificial intelligence to decrease the workload in single seat combat aircraft while improving survivability and effectiveness. In FY1990, the program will enter the prototype phase. Our objective is to make this a real option for the ATF at Milestone II and to provide for product improvement of other aircraft. The basic technology and concepts can be applied also to helicopters, submarines, and surface ships. Using a manned simulator, we have demonstrated the Pilot's Associate ability to help the pilot to perform a fighter mission in an extremely high-threat environment. The demonstration was not done in real-time, but in a reconstruction that allowed demonstrating real-time rates, very impressive performance was shown. Achieving real time performance is the principal challenge in the program and we have identified the steps to achieve that goal. This year we will demonstrate in the simulator the capability of the system to fit a real scenario, but not in real time. We will then start the prototype program in early FYI990 and by the end of FYI99I, we will demonstrate real-time performance with brassboard hardware.

Our Smart Weapons technology program offers a vivid example of competitive strategy implementation. U.S. strengths are in sensors, sensor processing for target recognition, and survivable autonomous air vehicles. Smart weapons will combine those technologies and focus them on an enduring Soviet/Warsaw Pact weakness -- their doctrine to employ mass armored forces in successive echelons to break through NATO defenses. This doctrine works only if the rear echelon forces are free to maneuver and have good command, control, and com-

munications. As a result of earlier DARPA programs like Assault Breaker, SACEUR developed the Follow-On Force Attack (FOFA) strategy that was adopted by NATO..

Our smart weapons program provides the next generation of FOFA weapons. Whereas, Assault Breaker was concerned primarily with attacking armored combat vehicles, the smart weapons will be focused on the extremely high value targets, such as: Tactical Ballistic Missiles (TBM's); mobile command posts in the rear echelon regiments and divisions; and other critical communication nodes. All of these targets can be protected, concealed, and camouflaged. Many of these targets will be found in forested areas where they are difficult to detect under foliage. The multisensor suites and processing concepts that we are developing are aimed at being able to "dig" those targets out of the clutter. This year we will demonstrate real-time, multisensor search and automatic recognition of these difficult targets.

Application of our advanced target acquisition technology program is another way to exploit U.S. strengths and focus it on an enduring Soviet weakness. Much progress has been made in theater target acquisition through the Joint STARS program. Even with JSTARS, however, a dedicated reconnaissance, surveillance, and target acquisition (RSTA) capability is needed in the Army to serve the Corps Commander and Division Commander as well as brigade and battalion levels. We are currently working with the Army and with European commanders to better understand the needs, the limitations of existing capabilities, the technology and systems options for the future, and the architecture within which a dedicated RSTA capability should be inserted. We are planning for a significant effort to develop and demonstrate the technology beginning in FY1990. In addition to the program definition and study effort, we are continuing the testing and demonstration of a battlefield moving target indicator (MTI) radar that was developed for use on UAVs. This lightweight, relatively low cost radar can effectively complement JSTARS by providing a capability to lower levels of command.

Following recommendations of the Defense Science Board Summer Study of 1986, DARPA initiated a smart mines program concerned with land mine and countermine warfare. The program includes the development of technology and concepts for wide area, smart, controllable mines, mine detection techniques for countering land mines, and anti-helicopter mines. Mines can be very effective in defense, but in classical form can be a hindrance in counter offensive operations. A potential solution to this problem is the capability to control

mine fields by turning them on and off. We believe this is possible in a way that defies enemy countermeasures. We can also increase the effectiveness of mine fields by providing networks of mines with extended area or wide area mine concepts. We are currently in the competitive concept definition and exploration phase of the program. In FYI990 and FYI99I, we will advance to technology development and demonstration phases.

While not in the same vane of automation and unmanned systems described above, our program to exploit the performance advantage of high angle of attack maneuverability for fighter aircraft offers a decisive edge in air-to-air combat. Fabrication of the X-31 aircraft which will demonstrate Enhanced Fighter Maneuverability (EFM) technologies has begun. The X-31 EFM project, which is one of our Nunn Initiative efforts, is a cooperative effort between the U.S. and Federal Republic of Germany -- the first international x-airplane program. This experimental aircraft will demonstrate a new concept for achieving the advantage in short range, air-to-air combat even when out-numbered by two or three to one as U.S. and NATO forces would be. The aircraft design was completed by the U.S. and German prime contractors (Rockwell and MBB). Final assembly of the first aircraft was initiated in November. A second aircraft is also under construction. The program started in FY1986 and first flight is scheduled in the first quarter of FYI990.

This project is crucial because of the evolving Soviet threat which will make beyond-visual-range air combat much more difficult in the future. Without enhanced maneuverability, the short range air-to-air combat advantage belongs to the side with the largest number of aircraft. U.S. and NATO strategy has been to maintain a major advantage in beyond visual range so that when the battle closes to short range, the NATO forces would out-number those of the Warsaw Pact. In the future we must have a way to win in close combat even if out-numbered. Enhanced maneuvering agility may provide this. Results of the program will be valuable in designing maneuverability improvements for current aircraft (e.g., Agile FALCON) as well as for design of future aircraft to succeed the F-I6s and F-I8s, and beyond that, much of the technology feeds directly into concepts we are exploring for short take off and vertical landing (STOVL) aircraft. In our Advanced STOVL (ASTOVL) program, also a Nunn Initiative, we are working with the U.K. and with NASA to explore technologies and advanced aircraft concepts that combine increased survivability on the ground with high agility and survivability in the air.

TECHNOLOGY FOR TREATY VERIFICATION

Since 1958, DARPA has been chartered with the development and demonstration of advanced technology for detecting, identifying, and measuring nuclear events to support verification of international test ban treaties. We have supported the development of the world's most advanced seismic sensors and phased arrays of such sensors, signal analysis and nuclear yield estimation methods, and nuclear radiation detection technology.

Last year we demonstrated the second of three high frequency phased arrays of seismic sensors that are installed in Europe and we began development of the technology for a network of monitoring stations that will be deployed within the USSR. The analysis of the data from these phased arrays and later the entire network will be accomplished by computer systems utilizing artificial intelligence methods to aid in the separation of nuclear events and earthquakes.

We have expanded our support for treaty verification through the development of ultra-sensitive chemical detectors. These could be deployed for field use to provide early warning of sublethal concentrations of toxic agents; or could be used for strategic intelligence -- CHEMINT -- to detect the manufacture of CBW agents. One of our recent sensor developments using biotechnology to achieve both remarkable sensitivity and specificity in responding to toxic agents has been licensed by our research contractor to Dupont to provide a commercial supply for the Services.

With these five strategic thrusts, I have described the core of our program. But in an organization like DARPA, we must always be planting seeds for the future. To that end we are providing a small amount of funding for a number of highly speculative concepts with the potential for very high payoff. One is our investment in charged particle beams for tactical applications. We are trying to understand the physics of beam propagation through the atmosphere so as to increase range, and to design and develop particle accelerators that are sufficiently small and light for tactical use. We have programs in neutrino detection, optical computing, biotechnology, applied mathematics, robotics, microsensors, and high efficiency propulsion and power to mention a few.

BUDGET

The DARPA Fiscal Year 1990/1991 revised budget request for FY1990 is

$1,092.4 million and for FY1991 is $1,121.3 million. I would like to make a few points about these budget levels. First, basic research, or 6.1 funds, accounts for $110.1 million, or 10 percent of the total and we have held it at that in FY1991. I consider our investment in basic research critical for the long term vitality of DARPA, and that is true for DoD as a whole as well. There is no "right" level that can be justified, but I consider 10 percent to be a minimum and will protect it from being reduced below that. Second, in FY1989 DARPA's mission was expanded to include new initiatives in manufacturing technology. Specific programs and the accompanying budget as well as personnel were transferred to DARPA from Defense Research & Engineering to support the additional responsibility. We welcome the additional activity as important to Defense and well suited for DARPA, but I would not want the Congress to look just at our "bottom line" budget and conclude that we have sustained significant growth without new responsibilities. Third, we have established a program element for prototyping advanced technology and innovative concepts. This was prompted by a desire to give increased visibility to this important activity, even though it is currently funded at a modest level, and also to raise "accounting barriers" to protect other research important to DARPA's traditional mission. The DARPA budget request aggregated according to the five primary thrusts discussed previously is shown in the following chart:

$ in Millions

	FY1990	FY1991
Leadership in High-Leverage Technology	353.1	370.6
Lowering the Cost of Defense	343.8	338.1
Respond to Major Threats	228.6	231.0
Exploit Technology to Gain a Major Competitive Advantage	89.7	94.0
Technology for Treaty Verification	27.2	28.6
Other and Support	50.0	59.0
	1092.4	1121.3

IMPORTANCE OF THE ROLE DARPA PLAYS IN DEFENSE R&D

In DARPA we move out ahead of formal requirements to develop advanced technology, pursuing the risky course usually shunned by others. And we move quickly, in order to capitalize on the technology advantage we seek. We have little bureaucracy and little overhead, and we hope to continue to be the small

agency that makes a big impact. With 1/3 of 1 percent of the Defense Budget and with an insight into Defense needs, DARPA is encouraged to look for imaginative solutions in advanced technology, unconstrained by traditional thinking and approaches. It is a relatively small investment and a very important role we serve, and I think the Nation gets its money's worth.

We have had a good year. But we are stretched thin and we are facing a growing crisis in recruiting and retention of the quality science and engineering management talent we need. I said that last year and nothing has happened to improve the situation.

Despite these problems, we intend to continue to provide cutting-edge technology for defense, and we look to the Congress for continuing support.

DR. CRAIG I. FIELDS
PROFESSIONAL SUMMARY

Dr. Craig I. Fields received his B.S. degree from the Massachusetts Institute of Technology and his Ph.D. from the Rockefeller University. After serving on the faculty of Harvard University he joined the Defense Advanced Research Projects Agency (DARPA) in 1974, where he is the Director.

DARPA is the research arm of the Office of the Secretary of Defense. At DARPA Dr. Fields is responsible for leadership and both technical and budgetary management of the R&D programs in advanced military technology and in dual use technology, impacting both national security and economic strength through commercial spin-off. While most effort serves to strengthen the U.S. industrial base, there is significant support for American colleges and universities, e.g. half of the U.S. graduate students in computer technology are funded by DARPA.

The areas of concentration are computer technology, including supercomputers, software production and microelectronics; artificial intelligence and its applications; telecommunications; manufacturing technology; high performance materials, including electronics materials; advanced physics applications; ASW and submarine technology; armor and anti-armor technology; smart weapons; and aerospace and strategic technology. Included are efforts of national importance: the program to produce the revolutionary new high temperature superconductors, announced by the President last year; the ground-breaking industry-government consortium, Sematech; the Strategic Computing program, the U.S. effort to develop fifth generation computing technology in the face of foreign competition; and, development and deployment of the nuclear test detection systems for treaty verification.

While these activities have major effect on strategic and tactical Defense needs, the technology base also addresses pressing concerns of counter-terrorism, counter-narcotics and conflicts involving Third World allies.

Dr. Fields works with the Senate and the House of Representatives on the Defense program and R&D activities of interest to members of the Congress. He is a frequent invited speaker at community organizations, professional societies, and colleges and universities. He coordinates with the venture capital community to assure private investment will capitalize on Government funded R&D efforts. Dr. Fields is also responsible for the implementation of joint technology development efforts with our allies in Europe and the Pacific Rim.

In 1988, Dr. Fields was awarded the President's Distinguished Executive Rank Award for outstanding service.

ADVANCED SUBMARINE TECHNOLOGY PROGRAM

Mr. DICKS. Mr. Moore, the Congress provided, as mentioned, $113 million in fiscal year 1988 and $95 million in fiscal year 1989 for DARPA's Advanced Submarine Technology Program. Last year, the Congress directed that the program be budgeted by the DOD at no less than $100 million per year, in order to provide a stable, long-term program. There are, once again, no funds in the Reagan budget to continue the program.

Why has DARPA not budgeted any funding to continue this program?

Mr. MOORE. We sought funds for this program. The decision was made at higher levels, that given our priorities, this program would not be included in the President's budget. Within our own budget we have been subjected to cuts. Our budget was first established for the programs that were ongoing within DARPA. Then it was cut 16 percent in the 1989 budget. We had further cuts in the 1990 budget. We asked for money twice, both during the review of the POM, and later during the budget cycle. We were not successful with getting the additional funds from the Secretary of Defense.

Mr. DICKS. This doesn't mean from your perspective that you don't think this program is warranted. Do you consider it a high priority?

Mr. MOORE. It does not mean that. It is a high-priority program and we fully support it.

Mr. DICKS. DARPA did not include this program in its original budget request to DOD. Are you saying that is inaccurate?

Mr. MOORE. It was not within our budget allocation. We had a figure established. Since the program was not in the DARPA budget in fiscal year 1988, nor was it in the DARPA budget in 1989, our base line was a program for all of DARPA's projects. It did not include the submarine technology program. In addition to that, we had received reductions in our budget allocations, so it wasn't possible to include the program within the DARPA budget. We asked for the money over and above the DARPA budget. Of course at the time the option was to put the money in the DARPA budget or to put the money in the Navy budget, or put some of it in the Navy and some in DARPA.

We requested the money above our budget allocation.

Mr. DICKS. What was the logic behind not requesting funds originally? Isn't it generally more difficult to obtain extra funds late on in the budget process?

Mr. MOORE. The logic was that we would have had to stop many other programs. This is one of our largest programs. We would have to terminate a lot of other programs that were also important in order to include this one.

Mr. DICKS. Was it on the theory that since Congress is so enthusiastic about it, why should we have it in our budget? Let them put it in?

Mr. MOORE. That was not our theory at DARPA, no, sir. We tried to get the money from the Department of Defense. We felt that it was fair, given the other reductions that we had to face, and we had to reduce our budget.

Mr. DICKS. In light of this funding problem at DARPA, why shouldn't we switch this program to the Navy? I never knew why we used DARPA in the first place. Has DARPA done much for the Navy over the years?

Mr. MOORE. DARPA has worked with the Navy.

Mr. DICKS. In ASW?

Mr. MOORE. Yes, sir, we have, going back to 1971.

Mr. DICKS. What have you done?

Mr. MOORE. One of the first programs we did was a program called LAMBDA, which means Large Aperture Marine Basic Data Array. That was a 6,000-foot long acoustic array that led to the surface towed-array surveillance system, which is now operational and making a major contribution to our capabilities. Then we started the non-acoustic ASW program, later transferred to the Navy.

The third significant thing was the acoustic research center which was exploitation of computational capability to include the first large-scale parallel computer for ASW purposes. If you go back far enough, DARPA had done some work in the radical submarine concepts, also in the early 1970s.

In this case, I think your point is that why is it that DARPA, and at the time I must be honest and tell you that I didn't think it was a good idea that this program be given to DARPA. It was a management burden. It was difficult to staff up, to handle this program, but I think it is going very, very well. We have very good people at DARPA to manage it.

Now the Navy understands. Some people in the Navy at the time felt it was a good idea. I think we have broad agreement within the Navy that it is a productive program. We now fully support it. We have it established. We think the thing to do is to continue that program. The products, we think, are going to be very significant in the near term, dramatic in the long term. We think that we can go ahead and in fiscal year 1990 and fiscal year 1991, and start a process of transitioning the products and the programs of the advanced submarine technology program back into the Navy and in an orderly process end up with significant fractions being well-established in the Navy, with a new attitude and approach by the Navy to manage this program and with parts that are sensible for DARPA to continue, with the higher risk elements to remain at DARPA.

So we think it is, it has been very well, it has been very well done. We think the program certainly was needed.

Mr. DICKS. Do you get into submarine design? You talk about a radical design as a previous initiative. Are you now looking at the submarine design as part of this submarine technology program?

Mr. MOORE. We are not designing submarines, Mr. Dicks. What we are doing and what we feel we have to do is we have to look at how the technology might be applied in future submarine design. We look at the concepts. We have to do this in order to establish the priority for the technology efforts and to be able to assess their benefits to future submarines. But we don't design submarines. We do conceptual studies of future submarine concepts. We get a lot of help in that from the Navy and then we also do it independently. We have parallel efforts going. Some of it is done with the Navy and some of it is done independent of the Navy.

Mr. DICKS. Is that with outside contractors?

Mr. MOORE. Yes. In fact, we have, I believe it is four contractor teams at the present time looking at the technology, looking at how the technology can be integrated in the future submarine design concepts.

Mr. DICKS. What principally are you doing? What are the principal initiatives that are being done in this program?

Mr. MOORE. Let me go through the areas that we are actually working on.

First of all, we are developing advanced methods in computational hydrodynamics so the tools are available to improve the design process in the Navy for future submarines. To a large extent this is taking advantage of the capability that exists and applying it to submarines.

We are working on an area that is extremely important that we call structural acoustics. That has to do with maintaining the stealth of future submarines by looking at how you reduce in a dramatic way the passive radiation of the noise emanating from the submarine. ———.

We are working on electric drive systems for future submarines. ———.

We are working on composite materials that may lead to significant reductions in weight of the submarine so we can increase their payload. We are working on automation, how to automate the submarine, how to automate this operation so the manpower level required to operate the submarine would be reduced.

Those are some of the key areas.

Mr. DICKS. In 1988, the ASTP Program Plan called for fiscal 1990 funding of $170 million. The 1989 plan calls for only $95 million. Why has there been a dramatic change in the required funding, and what level of funding would be required in fiscal 1990 to fully fund those projects that your program managers feel are worthy of funding?

Mr. MOORE. We think the $95 million figure is the right figure for fiscal year 1990, and that is based on looking at the program that we initiated in 1988 that we are planning to continue in 1989 and how much money is required to continue the appropriate efforts in fiscal year 1990. So it is a new estimate.

Mr. DICKS. Is this the amount that is required to merely sustain the efforts already begun, or does this give you a really robust program?

Mr. MOORE. I believe it is a robust program. Essentially it is continuing what we have already started. Some of the efforts, they are parallel, competitive efforts, and there will be some necking down of the efforts, and some contractors will get less. There will be fewer contractors involved in each aspect of the program. Those remaining will be accelerated.

Mr. DICKS. Could you tell us a little bit about how your program is complementary to the Navy program. What is the Navy doing?

Mr. MOORE. In submarine technology or ASW?

Mr. DICKS. Both.

Mr. MOORE. In submarine technology ———.

Mr. DICKS. You can amplify this for the record.

Mr. MOORE. Well, the Navy is working on advanced submarine technology. They tend to focus more on the near term. They are working on ———.

Mr. DICKS. This is not in the context of the SSN-21? This is looking beyond the SSN-21. Are these things they would like to do for the SSN-21?

Mr. MOORE. ——— for the SSN-21, but would also be used in future submarines. They are working on ———.

They are working on the acoustic systems for submarines which is an area we are not working on in the advanced submarine technology program by direction of Congress.

Let me ask Captain Marc Pelaez. He is a Navy submarine officer and is one of their finest. The Navy sent him to DARPA to help us manage this program.

Mr. DICKS. I thought it was to control the program, not manage it. I am just teasing. Go ahead Captain.

Captain PELAEZ. I can answer some of those questions. I think, as you are probably aware, the Navy concentrated very heavily on SSN-21. In that 20 year interval, a number of developments going on such as improved performance machinery program resulted in certain capabilities that were incorporated into SSN-21. There was a lot of money put on the line in R&D with all focus towards the SSN-21. ———. Looking to the future, I will say that when you put that much emphasis on one particular platform, which was a necessity at that time, sometimes you tend to lose your grasp of where the next one is when you don't have a particular platform to focus on. I think what this program has done has forced the Navy to deal with that problem much earlier than they would have been forced to deal with that issue.

I think the whole issue of cost and force levels and all those things now are coming to the forefront as a result of some of the initiatives in this particular program.

Consequently, they have established a new office now, a Rear Admiral, a NAVSEA-92R. His sole task is to coordinate, put together a plan for the next generation and to address future programs. Within that context, within the Navy budget, as you know, there are a number of budget priorities for reductions in R&D that occurred. I think that is probably a natural consequence of trying to put a weapons system like the SSN-21 on line. The Navy is dealing with this issue. They have budgeted and have put a wedge in at least for some advanced R&D. There has been a tasking from the Chief of Naval Operations to Admiral Evens to define where the next program should go. Of course, there are some ongoing programs that have been around for a little while. Let me say that the Navy has reacted positively in that sense, that they have taken an initiative now to look at where they are going, which wouldn't have happened with this program not being in place.

ASW TECHNOLOGIES

Mr. DICKS. The House Armed Services Committee released a report stating that DARPA's advanced submarine technology program should receive continued funding and also that additional ASW technologies should receive funding.

If additional funds are made available to DARPA for ASW—outside of the submarine technology program—what technologies would you pursue and why? Why should DARPA be provided these funds instead of the Navy, and how would your program complement those of the Navy?

Mr. MOORE. We would, first of all, pursue ——— the underseas surveillance capability of the future. We have to find new ways of doing undersea surveillance. We would work on the technology for hydrophones, the processing methods to make these arrays affordable. ———. Those functions which are performed manually now by operators, will have to be done by computers. There will not be enough operators available to do that.

We would continue and augment, accelerate our efforts in nonacoustic ASW, the efforts involved in the use of ———.

We would exploit unmanned, underwater vehicles that could accompany attack submarines in forward areas for detection and classification of threats of enemy submarines in forward areas.

Finally, we would work on new techniques next for localizing submarines that have been detected by surveillance systems in a way that would permit the rapid delivery from long range of antisubmarine weapons ———. Those would be the primary things that we would work on.

Mr. DICKS. These items that are not being done presently by the Navy?

Mr. MOORE. In some areas the Navy is working on the same subjects, and it looks like they are the same things, but these are additional efforts that complement what the Navy is doing.

Mr. DICKS. In your professional judgment, do you think DARPA should get this money rather than the Navy?

Mr. MOORE. I think the Navy budget should be augmented as well as DARPA's budget. I think DARPA should be in this business, that we have a track record, that we bring a unique approach. We can bring an expanded community from industry, from academia that can make a major contribution to this problem that we face.

Mr. DICKS. Mr. AuCoin?

HIGH DEFINITION TELEVISION (HDTV)

Mr. AUCOIN. Thank you, Mr. Chairman.

Dr. Fields, I want to ask you a series of questions about this new technology, HDTV. I guess that means high-definition TV. Before I do, I want to pay DARPA a compliment. You don't get many compliments, but you do do a good job. Your agency has come through a major effort with the Army leading to an AAWS-M decision. The winning candidate in the AAWS-M selection was tank breaker which began its life as a DARPA project. I know by now tank breakers are old hat to DARPA, because you are on to other things. But what is old to you is state-of-the-art to the Army. And if it weren't for what you did, the infantrymen in the future Army would not have much of an improvement over what he now has in terms of going after an enemy adversary armor. So I want to pay DARPA a compliment for the tremendous work it did and the role it played in that AAWS-M final selection.

Dr. Fields, let's talk about—as I said, I have a series of questions on the HDTV. The technology here is somehting that interests me.

I was deeply involved in the SEMATECH question, as you know. I read lots of things about what the Japanese are doing and foreign countries are doing in developing the HDTV technology, and what we may not be doing, and what the consequences may be. I am excited about what DARPA is going to do. I think HDTV is a technology that could have signficant benefit to military intelligence and other defense systems, systems that need graphic displays. I also think the United States has the chance, still has the chance, to take the lead in development of this new technology rather than lose it, as it has so many other technologies with foreign competition.

But I am more concerned about reliance on foreign sources for defense technology. I just don't want that to happen here.

Dr. Fields, I understand DARPA has identified something like 50 proposals that you would deem technically qualified and mutually supportive for HDTV funding. Is that true? If so, how much funding would be needed for those proposals that you find technically qualified in those fields?

Dr. FIELDS. We did a competitive procurement and received short of 90 proposals. In reviewing them, we narrowed it down to 49 that not only were excellent in their concept but also were mutually supportive. If you took any one away, it would naturally lose value. Funding those proposals over a three-year period is about the same size investment as the government's expense of SEMATECH. It is about $96 million a year.

Realize that will be matched by even more investment from the industries because those were heavily cost-shared proposals, from teams of companies.

Mr. AUCOIN. Do you have any estimate of what that would leverage in federal dollars?

Dr. FIELDS. Probably $1.50 for every federal dollar.

Mr. AUCOIN. I noted a newspaper clipping announcing the resurgence of the Sarnoff Research Center in Princeton successfully demonstrating what they said was the world's first broadcast system for high definition television that was compatable with existing TV sets. I recognize the reception quality was only as good as the TV set. Nevertheless, it shows advances are being made here.

What do you make of that development? If private labs and companies are now pursuing this technology with that kind of vigor, do we still need to invest in DOD for HDTV?

Dr. FIELDS. The most exciting aspect of the 49 proposals is that they, the technical ideas, the technical contents of those proposals, the evidence of what U.S. companies have in the lab, convinces me we actually have better technology in the laboratory now than that available to companies in Japan or those that I know in Europe.

You never can tell everything that is going on, but I think we have a lot of data. The problem is the manufacturing technology, getting it out of the lab, making it more practical and getting it to the point where DOD and the other sectors of the country can use it.

We knew about the Sarnoff work. In fact, that is more evidence that there is something there. Two things are to be said. One is the

demonstration that they showed wasn't the high definition TV technology.

Secondly, they are substantially funded by a French firm also. Thus, the intellectual property rights of that which was demonstrated, are not necessarily American property rights.

Mr. AUCOIN. That brings me to a criticism I heard made about DARPA and its approach to HDTV. This criticism is at variance with what I understood DARPA's position to be. The criticism is that DARPA refused to exclude foreign firms from responding to your solicitation of the HDTV program. You refuse to exclude them. The criticism is that in your view, the competition in contracting act precludes the exclusion of those firms.

That is at variance with what I understood and what my staff understood from you, Dr. Fields, when they spoke to you a couple of weeks ago.

What is the case there?

Dr. FIELDS. Well, in fact, the ruling on whether we could exclude foreign firms is a ruling from our general counsel. As always in these matters, there are different opinions and views on the subject.

Realize in "receiving these proposals," this is not the acceptance for funding. We have received them with proprietary information for review. Our intention is to serve the United States and to establish an American industrial base. And in reviewing those activities, we have looked for commitments to research and development in the United States, production in the United States, plowing back profits into future activities in the United States, jobs for scientists and engineers here and manufacturing workers here. We want that to be here in order to establish the infrastructure to the extent that is possible. The fact is, having now reviewed the program, there is no question in our mind that we can have absolutely solid effort, which is an American effort.

Mr. AUCOIN. One hundred percent?

Dr. FIELDS. No company has no foreign stockholders. But that when the Congress sees our selection——

Dr. FIELDS. When Congress sees our selection, they will say this is an American company.

Mr. DICKS. Would the gentleman yield for a point of clarification?

Mr. AUCOIN. Certainly.

Mr. DICKS. You said you solicited proposals from all of these companies, some of which were international. Isn't that also a good way to find out what everybody else is doing?

Dr. FIELDS. It certainly is. I wanted to be circumspect. It is pleasant to be able to read all the proprietary information in those documents.

Mr. DICKS. Thank you for yielding.

Mr. AUCOIN. I understand your funds for HDTV displays were reprogrammed from other working man-machine interaction. How much of other parts of DOD, or for that matter, other agencies of the government reprogrammed for this project?

Dr. FIELDS. To date, no other parts have.

Mr. AUCOIN. What about NASA?

Dr. FIELDS. We had a suggestion with NASA about their investing concurrent with our investment with the display. They may choose to do so. They have not said no. FCC, Commerce, NSF have, in fact, said no.

Mr. AUCOIN. Do you expect an answer reasonably soon or is it possible to say?

Dr. FIELDS. It is difficult to say. They have many commitments to the space station. I wouldn't be surprised if they were unable to step forward.

Mr. AUCOIN. What is the particular nature of your working relationship with the Department of Commerce on the HDTV?

Dr. FIELDS. The President asked Secretary Mosbacher to lead the government planning process and subsequent government effort in this area. What the Secretary of Commerce asked was that DARPA do what it needed to do, namely, develop technology with the Department of Commerce and other parts of the government like the FCC, trade policy and things like that. It is a very close working relationship.

Mr. AUCOIN. Does Commerce have any money for this purpose?

Dr. FIELDS. No.

Mr. AUCOIN. You have the money?

Dr. FIELDS. Right.

Mr. AUCOIN. Can you use more?

Dr. FIELDS. Yes, we can use more.

Mr. AUCOIN. What are some of the military implications of your program in this field?

Dr. FIELDS. Realize that we have been investing in displays, processors and software for 30 years, so there is nothing new about the military need. McDonnell Aircraft studies have shown that putting aircraft displays of the type that come out of our program in fighter airplanes can increase kill ratios from 1.4 to 1.8 in our favor. JSTPS has maps on the wall with tissue paper and red lines showing where our nuclear weapons will fly. In the current scheme it takes 18 months to do a new plan. With new computer technology it will reduce that to hours. You cannot draw red lines on paper maps. There are many, many examples.

Mr. AUCOIN. Those are two very good examples.

For the record can you provide additional ones?

[The information follows:]

Additional examples are in the areas of tactical reconnaissance, nuclear testing and airborne video instrumentation systems.

In the area of tactical reconnaissance, we presently rely on photographic film cameras to record and distribute tactical information. Since the film processing time is too long (i.e., film has to be developed and prints made for analyses), the need is to move to electronic signal representation of this information. The objective is to have the image on the ground in analysis before the plane lands. This is particularly important in chemical warfare situations where planes cannot land often. With electronic imaging, the plane can do multiple missions without having to land and reload film. Furthermore, the trend is towards unmanned reconnaissance vehicles. Therefore, any miniaturization, such as frequently takes place when technology is transferred into consumer products, will help meet these military requirements.

Nuclear tests require a high speed data link between instrumentation in "the hole" and equipment at the surface. Since the test destroys the equipment in the hole, and a large number of datalinks are required, an important consideration is cost. HDTV also requires high speed data transmission technology. Since the consumer electronics market is very price sensitive, progress in HDTV will help meet nuclear test objectives of price and capability.

Modifications to aircraft, such as structural reconfiguration, attachment of new armaments or pods, must be tested under flight conditions to determine their actual aerodynamic effects. Presently, this test information is recorded on photographic film, processed by support contractors and then digitized for analysis. This process takes at a minimum two weeks and may take months. If the test result are inconclusive or do not yield the required data, the test aircraft must be reconfigured again and the tests repeated. Electronic, high resolution imaging would allow a virtually instant first order assessment of the test's success, and would provide the data already in digitized form for rapid analysis. New airborne weapons systems could be tested and fielded more rapidly, improving readiness and reducing test costs.

Mr. AuCoin. Will the technology you are developing in your program have any impact on industries other than the HDTV industry?

Dr. Fields. Yes, absolutely.

Mr. AuCoin. Semiconductors?

Dr. Fields. Yes. The whole reason this is an important issue is that it is not just a television issue. It is an issue of microelectronics, displays, processors, DRAMS, initial flat panel displays and most importantly, the manufacturing tools underneath that. There are similar tools for the flat panel and semiconductors. All of those as well as personal computers and work stations will be influenced by this as well.

Mr. AuCoin. Do you intend to fund any work on manufacturing technology under your plan?

Dr. Fields. Yes, absolutely. That is critical because there is where our major gaps lie.

Mr. AuCoin. If your program isn't fully funded, what would be the consequence in terms of military dependence on foreign sources? Are foreign producers moving so smartly forward that we would be in the state of dependency?

Dr. Fields. There is no question that later in the 1990s we would be in the state of dependency. In Japan an investment has been $1.2 billion to date. In the United States, it is a few million dollars.

Mr. AuCoin. That is astounding.

One last question on HDTV, what is happening in the Soviet Union with this technology? Is there any evidence that they can seek investments in this?

Dr. Fields. They decided to set themselves up unilaterally as the world center for high-definition TV. They have invited companies to bring their equipment there, and this is happening.

It is a very grave situation.

Mr. Dicks. Mr. Miller?

SUBMARINE COMMUNICATIONS

Mr. Miller. Mr. Moore, we understand that DARPA and the Navy have reached an agreement on a joint program developing a laser communications system for submarines and the program would focus in the near term on the airborne laser, while keeping the option for a future satellite-based laser.

Would you give us a description of the agreement and the importance of this effort for future Navy missions?

Mr. Moore. The nature of the agreement is to prescribe the activities that will be funded by both DARPA funding as well as

Navy funding. Essentially it is a joint program. It is not a Navy effort, not a separate DARPA effort.

It is truly joint. It involves the demonstration of laser transmitter receiver on a submarine and it involves the simultaneous demonstration of the laser transmitter and receiver on an aircraft, eventually a transmitter and seeker that could be used on a high-altitude aircraft. We think the eventual technology could be used on a satellite. We think that that is very important technology. It is a fast-track program. We will do that demonstration in the 4th quarter of fiscal year 1990. We think that that is extremely important in showing what can be done with solid state laser technology for that particular type of communications system. We think that is important operationally to show that such a communication system will work and what it can do for submarine effectiveness. I would point out that it is going to be very important that the communication from the submarine be covert so that the submarine cannot be located by detecting the light that is emitted from it by the laser. I think if we are not able to develop what we call low probability of intercept capabilities with that up-linked part of the system. Then I am concerned that the submariners will not accept that. But it is a very important system in order to have connectivity to our future submarines more so than it has been in the past.

Mr. MILLER. Would this laser not only make it possible to communicate from aircraft to the submarine ———?

Mr. MOORE. The laser concept is possible that would do the ——— but it would not be the same laser. It would be the same general type of a laser system. We are doing other experiments in our ———.

Mr. MILLER. This program is the blue laser?

Mr. MOORE. That is the blue laser.

Mr. MILLER. The blue laser is a separate laser from blue/green laser, correct?

Mr. MOORE. Yes, it is. The laser we are using detects I believe, is a blue/green.

Mr. CLARK. The laser that is being used for the detection is a xenon chloride type of laser that has been tested in March against the submarine.

The laser used for communications includes blue and green lasers under an evaluation as part of the program.

Mr. MILLER. Would that laser be used so that it would pass ——— to pick up the submarine signal?

Mr. CLARK. ———.

Mr. MILLER. Do we believe that the Soviets are working on this type of technology?

Mr. MOORE. ———.

Mr. MILLER. The committee understands that a private company has developed and proposed to DARPA a relatively low-cost concept that takes advantage of the polar ionosphere to significantly improve our ability to communicate with deeply submerged submarines and other underwater platforms. Are you aware of the concept, and if so, do you intend to support a technology demonstration to test the value of the concept?

Mr. MOORE. Yes, sir, we are aware of that. We have had a briefing on that from the company that proposed it.

Mr. MILLER. Do you intend to support a technology demonstration to test the value of the concept?

Mr. MOORE. We have not made that decision yet, Mr. Miller. It is an interesting concept.

We still have it under evaluation. One part of the Navy has shown an interest in it. They are still looking at it. It has some interesting features.

Mr. MILLER. This is all down the road some time, it looks like. A satellite would have to be equipped with the necessary component parts and the submarines that would be necessary for them to be equipped.

So what are we talking about in time frame? Are we saying ——— years?

Mr. MOORE. For having an actual operational satellite?

Mr. MILLER. Yes.

Mr. MOORE. I think that would depend on how aggressively the program is pursued and how well it is funded. I would say ——— is probably too early for realizing an operational capability of a laser system on a satellite. It would be closer to ——— in my view, for a minimum time period to develop that system and have it become operational. More likely, it might be ——— just based on experience and recognizing the delays required in getting a military requirement in the Navy and getting the issues settled with the operational Navy and finishing the program.

Mr. MILLER. Did this type of a laser come as a fallout of SDI research?

Mr. MOORE. I don't believe it did originally. The concept started before the SDI program. It is an old concept going back to the mid-seventies.

Mr. MILLER. You are saying it was just never funded?

Mr. MOORE. It was never funded until the Congress funded it actually in the late seventies.

Mr. MILLER. Thank you.

Thank you, Mr. Chairman.

DIGITAL GALLIUM ARSENIDE

Mr. DICKS. Dr. Fields, last year this committee added funding for DARPA's Digital Gallium Arsenide program, since the program has experienced funding shortfalls once it was transferred from DARPA to SDIO a few years ago. The current budget request includes no funds to continue this program in fiscal year 1990.

What will be the impact if no funds are provided to continue this program in fiscal year 1990?

Dr. FIELDS. That is a complicated question. If no funds are available in the DARPA budget, we are going to close a factory in Reading, Pennsylvania, which is the only one that produces advanced gallium arsenide electronics in the U.S., not the only one in the world. It fabricates logic and memory chips. We will lose that manufacturing capability.

We will also cancel 11 contracts that have been started with firms to insert the gallium arsenide into intelligence and surveillance systems, weapons systems, electronic warfare systems, and one communication system. What we are trying to do is use it in

order to upgrade existing systems where we fear there will not be enough money to replace them with new systems. That kind of upgrading systems is increasingly important for defense.

Thirdly, there is money in the SDIO POM to do some work in gallium arsenide, but that is pre-reduction to the level which is $3.6 billion.

I don't know whether that money has been cut in the now-reduced request. If it has been cut because this has turned out to be a lower priority for SDIO, then they will be closing operations at Texas Industries, McDonnell Douglas, Rockwell, TRW and I can go into details.

Mr. DICKS. Why don't you elaborate for the record.

[The information follows:]

If the $19 million request for the SDIO gallium arsenide program is eliminated as part of the overall SDIO reduction, the following efforts underway in FY 1989 would have to be terminated.

Contractor	Effort
Galaxy (Austin, TX)	Fault tolerant architecture.
Mayo Foundation (Rochester, MN)	Computer-aided Design.
McDonnell Douglas (Huntington Beach, CA)	Nonvolatile Memory, 16 memory, and 23-bit microprocessor.
Rockwell (Newbury Park, CA)	16K memory.
SAIC (San Diego, CA)	SETA and MagiCAD support.
Spire Corp. (Patriots Park, MA)	GaAs on SOI.
Texas Instruments (Dallas, TX)	32-bit microprocessor and analog-to-digital converter.
TRW (El Segundo, CA)	Analog-to-digital converter.

These programs are in addition to DARPA's manufacturing and insertion efforts. The SDIO program develops advanced components, such as memories, microprocessors, and analog-to-digital converters, to meet their radiation requirements.

Mr. DICKS. What would it take to keep this program alive?

Dr. FIELDS. The commitment from the SDIO in fiscal year 1990 was $19 million for the work that I indicated in the last category. Again, that is SDIO funds in their budget. Within DARPA, the requirement next year is approximately $40 million, of which $9 million would be used to continue the factory operation in Pennsylvania, $31 million to continue the 11 upgrade contracts.

Mr. DICKS. In your professional judgment, do you think this is worth doing?

Dr. FIELDS. I think it is absolutely critical.

Mr. DICKS. Why aren't we doing it?

Dr. FIELDS. I can't answer the question. As Bob indicated earlier on the other priority work in submarines, when we knew the problem was appearing because of SDIO changes in budget, we sent numerous requests up the ladder.

Mr. DICKS. Can we give you all the money? If this committee wanted to continue this program, should you be given the money or should it be split?

Dr. FIELDS. If it is in our budget, we will consider it very high priority and we will not cut it. That is the best way to put it.

Mr. DICKS. The total amount was $40 million.

Dr. FIELDS. Forty-plus the 19; the SDIO request.

Mr. DICKS. Total of about $60 million.

Dr. FIELDS. Exactly.

DARPA FUNDING PRIORITIES

Mr. DICKS. DARPA requested funding of $1.1 billion in fiscal year 1990. Despite this large request, there is inadequate funding to continue the following congressional interest programs:

Advanced Submarine Technology Program, $95 million in fiscal year 1989, zero in fiscal year 1990; Digital Gallium Arsenide, $18 million in fiscal year 1989, zero in fiscal year 1990; High Temperature Superconductivity, shortfall of $12 million in fiscal year 1990; X-Ray Lithography, $20 million in fiscal year 1989, zero in fiscal year 1990; LIGHTSAT, $30 million in fiscal year 1989, $10 million in fiscal year 1990; and Lighter Than Air Technology, $30 million in fiscal year 1989, zero in fiscal year 1990.

It appears that, to DARPA, these programs are of lower priority than other efforts which you chose to fund. Is that accurate?

Dr. FIELDS. In terms of High Temperature Superconductivity, we did.

We did significantly increase the budget in fiscal year 1990, 1991 and the outyears. The net effect was starting in 1991 we will have no shortfall for that program. In 1990, there is a small shortfall, $12 million. We could not find enough.

X-Ray Lithography is more serious. That is the program where for two years running the Congress has added a total of $35 million over two years for this critical technology. Again, we tried very hard to request $50 million that was needed for that. That is a large amount for DARPA. It is the amount of all our work in terms of smart weapons. We just were not able to get those funds. In fact, when I did, I had some other programs that were lower priority to cut to find money for this, those funds were cut. Since the consequences of not doing x-ray lithography are impacting our digital circuits, it is very important.

Mr. HEFNER. What about LIGHTSAT and Lighter Than Air Technology?

Mr. MOORE. Congress started the LIGHTSAT program in fiscal 1988 with $35 million. We funded it in 1989 with $34 million out of our budget. In fiscal 1990 we had funded it at about $35 million.

With increasing funding in the outyears. In the POM cycle, we lost all of that money because it was, at the time I think, erroneously viewed as a program that had no military requirement. Then we worked our way back up so that once the budget was submitted we had $10 million in fiscal 1990, which is not enough money to carry out the program that Congress has mandated.

Mr. HEFNER. What would be the right amount?

Mr. MOORE. The right amount is $35 million minimum in the fiscal 1990.

Mr. HEFNER. What about Lighter Than Air Technology?

Mr. MOORE. That was a program started by the Navy. We were asked to take the program after the Navy had decided to terminate it, I believe that was in the fiscal 1989 budget review process. We agreed to take it with the understanding that this was a program that would in the near term, maybe after a year or two, transition back to the Navy. The Congress provided the money in fiscal 1989, at least enough money to keep the design process moving, $30 million. We expected that we would essentially be caretaker of this

program until the Navy re-established it or it was re-established in the air defense initiative. We don't think it is the right kind of program for DARPA but we were asked to see it through this period and we agreed to do that.

Mr. HEFNER. Thank you very much. It has been a good hearing. We have some additional questions which we will submit for the record.

The committee will adjourn now until Tuesday at 10:00 a.m.

[CLERK'S NOTE.—Questions submitted by Mr. AuCoin and the answers thereto follow:]

ALTERNATIVE MANAGEMENT SYSTEM

Question. Have you prepared the alternative management study required by last year's appropriation and, if so, what are its main elements?

Answer. The House Appropriations Committee Report directed that the Under Secretary of Defense (Acquisition) in conjunction with the Director, Defense Research Engineering and the Director of DARPA submit a report on an alternative management system for DARPA. DARPA conducted a staff study and prepared a report. The report was concurred in by the Director of Defense Research and Engineering. The report did not receive the concurrence of all OSD staff offices. It has been resubmitted by DARPA twice. We understand there may be an objection to any report that discusses a DARPA-specific solution as opposed to addressing issues on a DOD-wide basis. DARPA is not in a position to author a report that addresses management system issues on a DOD-wide basis. No report has received final approval within DOD as of this time.

The main elements of the DARPA-drafted report were a discussion of DARPA and the current environment; a discussion of challenges facing DARPA, emphasizing the maintenance of excellence in program management, and finding innovative methods of performing its work; a survey of possible alternatives management systems; and, a model for an alternative management system for DARPA.

Question. Have financial factors played a recent role in the resignation of any critical DARPA employees? If so, what kinds of employees have been lost?

Answer. Yes. However, the timing of some recent and pending losses was also affected by the pending new post-employment and job hunting restrictions imposed by the Procurement Integrity Amendments. Financial factors have played a role in the following recent and pending losses—Director, DARPA; Director, Prototype Planning Office; Director, Aerospace & Strategic Technology Office (early return of an IPA due to promotion at sending organization); Deputy Director, Information Sciences & Technology Office; Deputy Director, Defense Manufacturing Office; and several key technical program managers including the founder of DARPA's applied mathematics program, a key submarine technology manager and others.

Question. I understand the study recommends a five year experimental program that, in addition to paying bonuses, would give authority to DARPA to pursue their technology objectives through in-

novative agreements and non-traditional means similar to NASA. Please describe for the subcommittee what this would mean.

Answer. One aspect of the suggested agreements authority is simply to give DARPA authority to enter into cooperative agreements. Many civilian agencies as well as some of the military departments exercise this authority. OSD research and development authority (10 U.S.C. 2358) addresses contracts and grants but not cooperative agreements. Section 2358 is the legal authority DARPA uses to pursue its programs.

Other aspects of the suggested agreements authority would allow DARPA to enter into collaborative undertakings that do not fit the definition of procurement contract, grant, or cooperative agreements. Finally, the authority would allow DARPA to sponsor research through the use of reimbursable funding arrangements.

The new authority would not change the way DARPA does business in a fundamental way but would allow DARPA additional flexibility in certain situations. For example, in High Temperature Superconductivity (HTSC), we find that a number of consortia have been formed. DARPA may fund a university that is a member of a consortium. The other members of the consortium enjoy the fruits of DARPA funding but DARPA has no privity of contract with other members. Agreement authority that allowed DARPA to enter into a relationship with all members of the consortium and to review and optimize its research efforts could focus the research, multiply its effectiveness, and leverage the impact of DARPA funding. The actual funding instrument might be a contract, grant, or cooperative agreement with one or a limited number of consortia members.

In another example, a private party might supply a payload for a DARPA space launch vehicle, undersea vehicle, or unmanned air vehicle. Depending on the nature of the payload and the potential value of its data to DARPA, the flight might be with or without reimbursement and the terms of the data exchange would be adjusted to meet the needs of the parties. Clearly, this would not be routine but such opportunities may well arise.

The new authority is expected to fund a number of applications in the area of dual-use technologies such as computers, high temperature superconductivity, and high definition displays.

X-RAY LITHOGRAPHY

Question. In FY 1988 and FY 1989, the Congress added funds to the DoD budget for work in X-Ray Lithography. Why were no funds requested in FY 1990?

Answer. The X-Ray Lithography program was transferred to DARPA to manage, but it is a DLA budget line, and they did not request 1990 funding. However, DARPA has dedicated $1 million of its own funds in the DARPA proposed budget for a White House/DARPA interagency study group to develop recommendations for a national X-Ray Lithography program.

Question. What will be the consquences if there is no U.S. technology in X-Ray Lithography?

Answer. With no domestic X-Ray technology, U.S. Firms will have no choice but to buy X-ray lithography equipment from for-

eign sources. Since X-Ray lithography may be the only way to achieve critical dimensions less than .25 microns, the U.S. semiconductor industry will be reliant on foreign technology in order to produce competitive products. However, X-Ray lithography equipment most likely will be manufactured by vertically integrated companies that are also in competition with the U.S. for advanced circuits. Past experience with the Semiconductor Manufacturing Equipment (SME) industry indicates that less than state-of-the-art equipment will be sold to U.S. firms, disadvantaging them in the production of competitive circuits. This foreign dependence would be a serious problem for advanced military electronics systems.

HIGH PERFORMANCE COMPUTING

Question. How do U.S. and Japanese efforts in ultra-high performance computing compare? Will the DARPA programs keep the U.S. well ahead of foreign competition in this area? What research and development budget levels will be needed to keep us ahead? How has DARPA been collaborating with other agencies in this area?

Answer. The Japanese supercomputer program is very strong, particularly in regard to vector supercomputers like the Cray, in which Japan's increasingly dominant position in high performance electronic componentry gives them an inherent advantage. Cray Reseach expects to stay somewhat ahead of Japanese efforts in this field over the next few years, but probably can stay only slightly ahead. Moreover, Cray's dependence on Japan for certain of the components required creates a dangerous exposure. The Japanese are firmly committed to expanding their role in the conventional supercomputing market. They are making major investments in advanced component technologies while still using conservative architectures. However, Cray is the largest source of supercomputing technology in the world, and DARPA is working with Cray to reduce the barriers to move into more parallel and heterogeneous high performance computing systems. It is also important to note that Cray uses a higher degree of parallelism than the Japanese do currently.

In the new forms of scalable parallel computing, the U.S. is clearly the world leader, largely as a result of DARPA investments. These new parallel systems are starting to displace the conventional supercomputers in some applications because of higher absolute performance, improved cost-performance, and lower barriers to entry. Japan's efforts in regard to large-scale parallel supercomputing of the sort pioneered by DARPA has been considerably less focused and effective than their vector supercomputer push; hence the U.S. holds a lead in the parallel computing area which is still growing. However, recent evidence, including strategically placed purchases of U.S. equipment, indicates that Japan is preparing to duplicate successful U.S. efforts in this area, and may aim to produce systems of higher performance using more aggressive technologies.

For this reason, it is essential that U.S. efforts in this area move very vigorously. The minimal budet required for this has been estimated by FCCSET (Federal Coordinating Council on Science, Engi-

neering, and Technology), an interagency body headed by OSTP, with which DARPA has been cooperating actively. The agencies involved in the FCCSET effort have reached a joint view and drafted an overall National High Performance Initiative Reseach and Development Implementation Plan. The plan draft, now undergoing OMB review, contains budget details.

Question. Are we managing to use new forms of parallel computing effectively? What DARPA programs address this issue? Do we have enough people trained in parallel computing methods?

Answer. DARPA is addressing the application of parallel computing technology through several programs. (1) DARPA has a Parallel Computing Infrastructure Program to purchase machines for experimental use within the research and applications communities and to seed efforts within DoD and DOE government laboratories. This program accelerates technology transition by reducing cost risks for applications developers and other users. (2) DARPA has a program in Parallel Algorithms focused on the development of fast algorithms appropriate for the emerging parallel architectures. A portion of this program is managed jointly with the National Science Foundation. (3) DARPA has a program in Computational Mathematics focused on the development of scalable parallel solutions to conventional numerical problems. (4) DARPA's Machine Intelligence programs, specifically vision, speech recognition, and cooperating expert systems, are being moved to the parallel computing base. (5) Network technology has been upgraded among the major centers to enable high performance heterogeneous computing across local and national scale networks. A first generation of experts in parallel programming has emerged, and parallel programming is now an established part of the curriculum at leading educational institutions. However, it is clear that the demand for parallel computing equipment is nowhere close to being met, and that this is an inhibitor to progress.

Question. What service use of parallel supercomputing does DARPA expect?

Answer. DARPA expects Service use of parallel computing to fulfill critical mission requirements including ASW signal analysis, pilot aiding, aircraft design, and image analysis. NRL and CIA have been involved in parallel computing for more than two years as a result of early joint investments with DARPA. DARPA has begun to work through the Joint Directors of Laboratories to help them establish similar kinds of facilities. Many Strategic Computing Applications will make extensive use of parallel computing. The second round of Strategic Computing applications, now being initiated, will emphasize direct Service involvement.

Question. What is DARPA doing to help with the DOD software problem? Do you expect this problem to be solved, or will things just get worse?

Answer. The importance of software in weapons system has increased significantly, and DARPA is responding to this by accelerating activities focused both on improving capability in the long term and on accelerating the transfer of research results into Defense practice.

DARPA has three thrusts in software technology. The Software Engineering Institute (SEI) focuses on improving the state-of-prac-

tice in the Services and in supporting industry. The Software Technology for Adaptable and Reliable Systems (STARS) program is focusing on developing industrial-strength versions of emerging technologies for Ada systems.

The Information Sciences and Technology Office programs in software are focusing in several areas, including: (1) Systems software for parallel and distributed systems, (2) Trusted systems technology and formal methods for systems that must be highly reliable, safe, and secure, (3) Parallel programming languages and environments, to enable more effective utilization of the performance potential offered by the new high performance parallel computers, (4) Wide area file systems and persistent object management to create a technology base for large scale software and document interchange, including access control and usage monitoring, (5) Advanced environments that can manipulate software design information in support of trust and rapid adaptability, (6) Language and environment technology for the support of prototyping. DARPA is also investing in distributed software library technology so software components can be more readily shared and controlled, and so that the community can more rapidly converge on common systems interfaces, including working with the commercial sector whenever possible.

These efforts are focused on creating a software technology that will enable transition to more advanced acquisition approaches based on risk reduction (prototyping) and reuse of software assets particularly specifications, designs, and interfaces. In addition, the efforts are focused on achieving new capabilities for software systems, including ability to rapidly adapt systems, high levels of reliability and trust, and access to parallelism.

Because software concentrates function and flexibility in systems, improvements in software capability inevitably translate into increased demands for capability, flexibility, and performance. For this reason, there will never be a complete solution to the software problem. It is important to note, however, that software is increasingly becoming an area of international competition, both in productivity and in capability. Significant progress is being made in Europe, particularly, in software capability.

Question. What DARPA programs are addressing U.S. competitiveness issues?

Answer. In addition to directly manufacturing-related programs conducted by several DARPA Offices, many of DARPA's programs bear on U.S. industrial competitiveness in indirect but nevertheless very important ways. DARPA's Defense Manufacturing Office (DMO) manages the nationally important SEMATECH effort and is in process of initiating work on high definition display technology.

The Agency's Defense Science Office (DSO) supports important efforts in high speed Gallium Arsenide integrated circuit technology, new forms of very dense electronic packaging, optoelectronics, and new electronic manufacturing techniques, including "in-a-bottle" circuit manufacturing techniques which hold promise of reducing the capital costs of VLSI circuit manufacturing substantially. DSO also manages a significant "concurrent engineering" research and development effort, the DICE program.

In addition to computing technology efforts, DARPA's Information Science and Technology Office (ISTO) supports a portfolio of efforts in design and fabrication of mechanical components and systems, including advanced CAD dynamic modeling systems, a direct CAD-to-cut-metal design system, a stereolithography-based rapid die fabrication system, and others. Other relevant ISTO efforts include major VLSI design tool developments, computerized parts ordering systems with great potential for speeding up commercial transactions of all sorts, and artificial-intelligence based systems for automated diagnosis of faults in complex manufacturing systems.

Question. What role can computer simulation play in training and force readiness? In acquisition? In addressing broader military questions of tactical and strategic doctrine?

Answer. DARPA believes that computer-based battle simulation, carried down the level of physical events on the battlefield, can play a very great role in improving training, force readiness, and the accuracy with which acquisition decisions can be made and broad military question of tactics and doctrine can be addressed, across the board. A major and very successful project, SIMNET, reflecting these appreciations, has been conducted for the past six years by DARPA and is now transitioning to the Army while DARPA advanced simulation technology effects are moving on to new, all-service, technical concerns.

Concerning the potential impact of military simulation technology on systems acquisition and force effectiveness: The Services have become increasingly aware of the potential importance of large-scale computer Battle Simulation as a tool for training both at the tactical level and for Senior Commanders, as a means for improving the focus and effectiveness of the Defense acquisition process, and as an analytic tool for development and refinement of Defense operational doctrine. Simulations of two kinds are now in active use. Detailed or engagement simulations, exemplified by DARPA's SIMNET system, simulate all the essential tactical characteristics of individual weapons platforms and systems, allowing them to be fought, in real-time battles over visually recreated terrain, just as they would be fought in real battle. Operational or aggregated simulations, exemplified by Joint Warfare Center's JESS system, are intended for use in higher level command training exercises, up to multi-corps and theater levels. Present simulations of this second kind compute aggregated results of the activity of large military units (for example, entire brigades or divisions) as they maneuver and come into combat on terrain that is much more coarsely represented. A common technical feature of both forms of simulation is that they make extensive use of modern computing technology, which now inexpensively provides computation rates hundreds of times in excess of what was common yesterday.

Integrated use of these two forms of simulation has revolutionary potential for Defense effectivness. By inserting hypothetical new weapons systems into the detailed virtual world of an engagment simulation, one can assess their value in a combined arms setting. Countervailing systems can be assessed systematically and objectively, and effectiveness-enhancing system modifications can be explored far more rapidly and inexpensively than is now possi-

ble. This allows sharp focusing of the acquisition process, making it possible to assign some proposed weapons systems urgent priority, and to set others aside as ineffective. It allows threat systems to be evaluated in the same accurate, objective manner as friendly systems. It allows weapons system developers to be exposed to the problems of using their system in a combat environment, with great potential benefit to system design and battlefield usability.

The potential benefits of extensive simulation for force readiness and effectiveness are equally great. Simulation-based training in the use of new and existing systems can ensure that fully qualified crews are available as soon as new systems are deployed. Modern computer/communications technology can be used to link multiple sites into a single virtual battle, allowing effective and inexpensive combination of diverse military skills into task forces, and participation of reserve units in active-force training. In crisis situations, forces can be trained on simulated versions of the very terrain on which they may be required to operate (terrain which would typically be inaccessible for such purpose).

Question. Can we use DARPA technology for drug interdiction?

Answer. DARPA C^{3}I technologies and other technologies applicable to low intensity conflict situations are potentially relevant to drug interdiction. As noted in a recent DEA draft: "Maximization of the effectiveness, economy, and timeliness for operational deployment of useful technology rests on ensuring coordination, sharing, and compatibility of that technology and the associated techniques among those agencies and organizations responsible for counter-narcotics operations. This can, in fact, be realized if several conditions are acknowledged.

"First, many operational and technical requirements are similar among the various agencies involved in drug enforcement in particular and criminal or law enforcement in general. For example, many agencies and organizations are involved in investigation and intelligence collection support programs in audio collection, physical surveillance, radio and other communications, signal processing, and technical collection. Second, the technologies and techniques utilized in each and all of these are similar even if the operational conditions or situations differ. Sensor systems (for example, hybrid microphone components; image arrays), transmission techniques (radiofrequency or infrared; spread spectrum of packet); and collection equipment (optical storage; digital processing; database structures) are broadly related across the various agencies. Third, many of the same contractors in the public or private sector involved in producing equipment are used by the various agencies, owing to security and coordination problems, a history of successful development efforts, and access to state-of-the-art technologies and techniques."

However, the diffuse nature and many-sidedness of the U.S. drug problem makes it necessary to think very carefully about border, trans-border, and street realities to assure that available technologies are used with maximum effectiveness rather than becoming ends in themselves. To this end DARPA is cooperating actively with DEA and other agencies concerned with the drug problem.

Question. What has DARPA been doing about high performance networking? What is DARPA's involvement with other agencies in-

terested in networking? How do military communication and civilian networking technology relate?

Answer. DARPA has led the development of high performance networking since the inception of the ARPAnet effort nearly two decades ago. Anticipating a move of networking technology to optical-fiber based networks with gigabit/sec. data bandwidths, DARPA has been phasing down the present DARPAnet while working with other Federal agencies, through FCCSET (Federal Coordinating Council in Science, Engineering, and Technology) and through the interagency FRICC (Federal Research Internet Coordinating Committee) to ensure that the research issues of gigabit networking are addressed as soon as possible, and that investment/operation plans for stepwise development of very high performance networks are put in place.

Military networking shares a great deal of technology with high performance civilian networking, but differs in that it needs to emphasize radio technologies more heavily, and that it requires protocols for real-time configuration of networks whose nodes may be in constant motion and some of which may disappear suddenly and without warning.

Question. Has DARPA been doing anything about the computer virus problem?

Answer. DARPA has played a central role, both in dealing with the major recent virus issues and in developing new software trust technologies and secure operating systems to hinder the propagation of future viruses.

The long term technology challenge in this area is to develop reliability and security solutions that reduce the vulnerability of computer networks and systems while not overly sacrificing functionality, performance, flexibility, and interoperability. There are three aspects to this challenge: (1) operational support for computer security emergencies, (2) security and reliability for distributed and parallel computer systems, and (3) technology for producing highly reliable and secure systems of increasing scale and complexity. DARPA is involved in addressing all three aspects of this challenge.

Concerning operational support: DARPA developed a prototype computer emergency response capability within three weeks of the original virus incident. This capability consists of a Computer Emergency Response Team (CERT) drawn from industry, universities, and government, together with a CERT Coordination Center (CERT/CC) at the Software Engineering Institute. This CERT is intended to address problems in the unclassified Internet research community. In the months since it was formed, the CERT has already participated in responding to a number of intrusions and viruses. The CERT has also been involved in handling vulnerability information and in interacting with vendors. The current CERT activity is serving as a prototype for similar capabilities in other communities, and the efforts are being closely coordinated with both the NSA's National Computer Security Center (NCSC) and the National Institute of Standards and Technology (NIST) in the Department of Commerce. Both DOE and DCA have initiated similar efforts, and they are following the CERT model.

Concerning reliability and security for distributed and parallel systems: Scalable and distributed systems are inherently more suited to provide high reliability in operational environments because resources can be distributed and replicated. Research is underway to exploit this potential while maintaining a high level of security. A Unix-based parallel operating system called Mach is now working on a variety of workstations and parallel computers, and highly reliable and secure versions are now under development that will support large scale distributed computing.

Concerning larger scale reliable and secure systems: It must be understood that the recent virus problems were not problems with the networks or with the hardware, but were software problems, and that the vulnerabilities that were exploited were not errors of design, but errors of implementation. These problems highlight the potential impact of errors in software and the importance of maintaining a vigorous program of research in the development of highly reliable and secure software systems. DARPA has been involved over a long period in research in computer networking, operating systems, program correctness, and security technology. Research in longer term approaches at DARPA suggests that high reliability and security will be achievable in larger scale systems without the current large penalties in function, interoperability, flexibility, and performance. This long term effort will have significant commercial implications.

[CLERK'S NOTE.—End of questions submitted by Mr. AuCoin. Questions submitted for the record and the answers thereto follow:]

OCEAN IMAGING PROGRAM

Question. Mr. Moore, what is the status of DARPA's nonacoustic ASW program in ocean imaging?

Answer. Our radar ocean imaging program is doing very well. In the past year, we have analyzed data from a joint experiment that we conducted with the UK to improve our understanding of how internal waves are imaged by synthetic aperture radars (SARs). We are planning another such joint experiment this summer. We also conducted a joint experiment with Norway to investigate the use of multiple-frequency radars for internal wave measurements, with considerable success.

In addition, we have supported a number of theoretical investigations that have led to improved models of radar imaging, and that have resulted in new candidate approaches to signal processing and radar configuration. A high priority for the future of our program is to subject these theoretical models to experimental test, and we will devote a major part of our program to this effort.

In addition to the technical progress, we have made substantial improvements in coordinating our efforts with those of the Navy. We are now in the collaborative process of planning the future programs of both organizations, preserving independence of judgment for but avoiding needless duplication of effort. DARPA's role in this national effort will center around those issues, but we expect extensive interchange of technical results among the programs.

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Question. Has DARPA been able to work out both an unclassified and a classified memorandum of agreement on this program and if not, explain why not.

Answer. We and Norway signed a Memorandum of Understanding (MOU) in June 1988 for a program extending through June 1989; we are now in negotiations with them for an agreement to extend through 1991. We have signed a United States/United Kingdom agreement and sent it to the United Kingdom which they signed on May 5th.

Both the United States/Norway and the United States/United Kingdom agreements provide only for sharing unclassified work and data. Because the U.S. Navy is the executive for security in ASW, they would have to be the U.S. signatory for any agreement providing for classified work in this area. We don't know yet whether this will come to pass.

HIGH-DEFINITION TELEVISION

Question. Dr. Fields, there has been much publicity to date about the national concern over foreign investment in "high-definition TV" (HDTV). What is the issue, and why should DARPA specifically be involved?

Answer. HDTV is a technology driver for the semiconductor industry. Without a strong domestic HDTV effort, we will lose our semiconductor industry. DARPA should be involved because of the research and development needed to provide the technology base required for a viable domestic HDTV industry.

Question. Is it true that the Bush administration has designated the Department of Commerce to lead the national effort in HDTV? If so, what will be DARPA's role?

Answer. DARPA will provide for the research and development of the key enabling technologies.

Question. When will a program plan be approved by the Commerce Department which lays out required funding for this effort?

Answer. The program plan should be approved by July 1, 1989.

UNMANNED AIR VEHICLE PROGRAM

Question. When will the updated Master Plan for nonlethal UAV programs, due March 15, 1989, be provided to the Committee?

Answer. June 30, 1989. 1989 UAV Master Plan is in coordination with OSD, JCS, and the Services.

Question. Will the UAV systems eventually be procured as a result of the source selection process for the short and mid-range RPVs be common to all services?

Answer. Yes. Short Range UAV is common to Army, Navy, and Marine Corps. Currently, Air Force does not plan to field a Short

Range system. Although the Navy Short Range UAV is common to the Army and Marine Corps, it may have unique characteristics required for ship operations. Medium Range is common to Navy, Marine Corps, and Air Force. The Navy and Marine Corps require air launch only, while the Air Force requires both air and surface launch. The Navy requires sea recovery and the Marine Corps and Air Force require land recovery.

Question. Describe the program management procedures by which Service unique requirements for non-lethal UAV systems are integrated into a set of requirements that can be satisfied by a common UAV system.

Answer. Service requirements for UAV capabilities are submitted to the UAV Special Study Group (UAV SSG) of the Joint Requirements Oversight Council of the Joint Chiefs of Staff. The UAV SSG reviews the requirements of each Service, and consolidates the critical performance parameters into a single Joint Mission Need Statement that is submitted through the Under Secretary of Defense (Acquisition) to the UAV Executive Committee (EXCOM) for review. If approved by the UAV EXCOM, the Joint Mission Need Statement is forwarded to the UAV Joint Project Office for the development of a program plan. This program plan provides cost and schedule information needed for consideration of funding in the DoD PPB process. The UAV Joint Project Office, the UAV SSG, and the Services meet periodically to consider tradeoffs between system performance and costs.

Question. Will unique organizational units operate and maintain fielded UAV systems for each service? If not, which existing units in the active force structure will handle deployed UAV systems?

Answer. Each of the Services will determine the organizational unit/force structure best suited for fielding UAVs to enhance its mission effectiveness. Current plans are as follows:

Army: For the Short Range UAV—a separate company within the Military Intelligence Brigade at the Corps level; for the Close Range UAV—a separate company in the Military Intelligence Battalion at the Division level.

Marine Corps: For Short Range and endurance UAVs—within the current established RPV companies of the Surveillance Reconnaissance Intelligence Groups; for the Mid Range UAV—within the F/A-18D tactical reconnaissance squadrons; for the Close Range UAV—within the infantry companies of the infantry battalions.

Navy: For all categories of UAVs—detachments will be assigned to specific ships to operate the systems and will depend upon organic ship support for maintenance.

Air Force: For Mid Range UAV—part of the tactical reconnaissance squadrons; Close Range UAV—not yet defined.

Question. State total inventory objective for each UAV system (i.e. short range, mid range, close and endurance). Include the actual number of air vehicles as well as integrated systems.

Answer.

INVENTORY OBJECTIVES FOR UAV SYSTEMS

	Short	Medium
Air vehicles	424	525
Army	216	0
Navy	40	[1] 260
Marine Corps	144	
Air Force	0	265
Training	24	TBD
Intergrated systems	53	TBD
Army	27	0
Navy	5	TBD
Marine Corps	18	TBD
Air Force	T0	TBD
Training	3	TBD

[1] Navy and Marine Corps.

Close: The joint requirement for the Close Range UAV has not been defined. Only the Army has specified requirements for fielding Close Range to 18 divisions, 3 armored cavalry regiments and 4 separate brigades.

Endurance: The joint requirement for the the Endurance UAV has not been defined. It is expected that the Endurance UAV program will focus on the development and acquisition of long endurance air vehicles for use with Short Range UAV system components.

[CLERK'S NOTE.—End of questions submitted for the record.]

THURSDAY, MARCH 23, 1989.

STRATEGIC DEFENSE INITIATIVE

WITNESS

LT. GEN. GEORGE L. MONAHAN, DIRECTOR, STRATEGIC DEFENSE INITIATIVE ORGANIZATION

INTRODUCTION

Mr. MURTHA. The Committee will please come to order. Today we are pleased to welcome Lieutenant General George L. Monahan, Director of the Strategic Defense Initiative Organization. General Monahan will discuss the fiscal year 1990 budget request for the Strategic Defense Initiative, which totals $5.6 billion. The request represents a 51 percent increase over the $3.7 billion provided for fiscal year 1989.

General Monahan has appeared before the Committee in his previous capacity as Principal Deputy Assistant Secretary of the Air Force for Acquisition; however, this is his first appearance as SDIO Director.

I want to tell you, General, I remember being in Russia with the former Speaker and I never was too hot on the SDI program because I didn't believe we could create an umbrella; but the Russians believed it. Once they started believing it, I said to myself, there has to be something to this. We try to fund it at a reasonable level. You know the trouble we will have this fiscal year. I know some of these things you won't be able to answer because you are new to the SDI program, but I don't believe you can spend a $2 billion increase this year. But we will listen to what you have to say and then ask you some questions.

General, if you will summarize your statement, we will get right to the questions.

SUMMARY STATEMENT OF GENERAL MONAHAN

General MONAHAN. Thank you, Mr. Chairman.

It is a pleasure to be before this committee again and I do have a statement for the record. I have also provided a handout here that is simply reference material of the acronyms that we may want to refer to as we proceed through the hearing. The program has an awful lot of alphabet soup associated with it. So maybe I can refer to that.

[CLERK'S NOTE.—The classified slides have been removed.]

FISCAL YEAR 1990 BUDGET REQUEST

As you said, we have a number of important issues and topics associated with the SDI program at this time. The program is being considered in the strategic review that is now being conducted

under the Administration and also in the budget revision process that is underway. As you recall, we requested $5.6 billion for fiscal year 1990 in the President's budget and that number as well as the entire five year period out through fiscal year 1994 is being looked at in consideration of all other programs within the DOD.

One thing that I find encouraging about the process that is taking place there right now, particularly with the strategic review, is that we are going to have to have an integrated assessment of offensive and defensive systems so that we will have a good evaluation of how the two play together. The anticipated outcome from that is a program that will include offensive and defensive programs that all in DOD and the Administration can support.

STRATEGIC DEFENSE SYSTEM PHASES

The program that is described in this handout, and I will just describe briefly, is for Phase I of a Strategic Defense System. That is the program which was approved by the Defense Acquisition Board last fall. The President's budget as it exists today supports proceeding with that particular program. That program estimate to complete phase 1 is $69.1 billion. That is a figure which I personally think is too high. We can discuss that later, if you wish.

The program also is divided into three phases and the first two of those provide the basic infrastructure for any follow-on phases of the program that we may wish to proceed with. Those two phases are, first, the sensors, the sensors that acquire ballistic missiles that have been launched, can track them, can track the re-entry vehicles, help sort out re-entry vehicles from decoys. Those would be part of a program that could have additional phases as well.

Also, in phase 1, we provide the battle management and the command, control, communications architecture that would be required for follow-on phases. In phase 1, we provide interceptors ground-based and space-based that are the warfighting arm. The phase I of the program is designed to meet a Joint Chiefs of Staff requirement. That requirement is to ———. That says then that the Phase I of the SDI programs should be capable of ——— and the program is sized to do just that.

In our evaluation, the program, while it is technically demanding, is certainly within the realm of technical feasibility.

We are still very early in the development process. At this time, we have not entered full-scale development of any of the elements within the program.

The first element to go into full-scale development is the Boost Surveillance and Tracking System scheduled for full-scale development beginning late next fiscal year. The other systems would begin full-scale development later on. So we are still in the early process in the development phase. We are in the phase we call demonstration and validation. It is during that phase when we make a lot of tradeoffs between individual elements of the systems and we make a lot of tradeoffs between requirements for individual elements versus the ultimate specifications for those.

Mr. Chairman, having made those remarks, I believe that summarizes the statement and I don't want to take up all the time. I know that many of you have questions that you would like to ask and I will be happy to respond.

[The biographical sketch and statement of General Monahan follow:]

LIEUTENANT GENERAL GEORGE L. MONAHAN JR.

Lieutenant General George L. Monahan Jr. is Director of the Strategic Defense Initiative Organization.

General Monahan was born Nov 21, 1933, in Minneapolis and was graduated from St. Thomas Academy, St. Paul, Minn., in 1951. He earned a bachelor of science degree from the U.S. Military Academy in 1955 and a master of science degree in electrical engineering from the University of New Hampshire in 1963. He completed Army Command and General Staff College in 1967 and the Air War College in 1972.

Upon graduation from West Point, he was commissioned as a second lieutenant in the Air Force. In August 1955 he reported to Moore Air Force Base, Texas, for primary pilot training. He received his wings in August 1956 at Greenville Air Force Base, Miss.

His early military assignments included piloting fighter-interceptor aircraft, aircraft maintenance, and armament and electronics maintenance.

After completing a master's degree through an Air Force Institute of Technology program at the University of New Hampshire, he was assigned to the 6555th Aerospace Test Wing, Patrick Air Force Base, Fla., in October 1963. He worked on the Gemini space vehicle program and also flew aircraft missions in support of the testing of space vehicles and missiles.

Upon graduation from Army Command and General Staff College in July 1967, he was assigned to the 63rd Tactical Reconnaissance Wing, Shaw Air Force Base, S.C., where he completed RF-101 combat crew training. From January to March 1968 he attended Forward Air Controller School and O-1 combat crew training at Hurlburt Field, Fla.

General Monahan was assigned to the 20th Tactical Air Support Squadron, Da Nang Air Base, Republic of Vietnam, in April 1968 as a forward air controller and flew 75 missions over North Vietnam. In October 1968 he served as forward air control tactics officer, flying combat missions throughout Southeast Asia.

(more)

In April 1969 he was assigned to the Directorate of Operations, Tactical Control Division, Headquarters U.S. Air Force, Washington, D.C. After graduating from the Air War College in June 1972, he was assigned to Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio, as chief of the Projects Division AGM-86A Subsonic Cruise Armed Decoy Program.

General Monahan then contributed to the development of the F-16, becoming the first Chief of the F-16 European Systems Program Office. Subsequently, he was the Assistant Deputy Chief of Staff for Systems at the Air Force Systems Command and then System Program Director for the F-16 Multi-National Fighter Program. The general was assigned as director of development and production, Office of the Deputy Chief of Staff for Research, Development and Acquisition, Air Force headquarters, from August 1983 to July 1986. He then served as vice commander, Air Force Systems Command, Andrews Air Force Base, Md.

In July 1987 General Monahan became the principal deputy assistant secretary of the Air Force for acquisition, Washington, D.C. He assumed his present position on February 1, 1989.

General Monahan is a command pilot with more than 4,000 hours flying time and 122 combat missions in Southeast Asia. His military decorations and awards include the Distinguished Service Medal, Legion of Merit with one oak leaf cluster, Distinguished Flying Cross, Bronze Star Medal, Meritorious Service Medal, Air Medal with nine oak leaf clusters, and Air Force Commendation Medal.

He was promoted to lieutenant general July 1, 1986, with same date of rank.

General Monahan is married to the former Mary Rockwell of Minneapolis. They have five children: Cathy, George, Joe, Brian and Andy.

(February 1989)

STATEMENT ON

THE STRATEGIC DEFENSE INITIATIVE

BY

LIEUTENANT GENERAL GEORGE L. MONAHAN
DIRECTOR
STRATEGIC DEFENSE INITIATIVE ORGANIZATION

BEFORE THE

SUBCOMMITTEE ON DEFENSE
COMMITTEE ON APPROPRIATIONS
HOUSE OF REPRESENTATIVES

101st CONGRESS, FIRST SESSION

MARCH 23, 1989

Thank you for the opportunity to appear before this Subcommittee today to testify in support of the SDI budget request.

As you are aware, the top-level strategic review and revisions to the President's budget may result in an adjustment to the budget request for SDI and other programs. At present, however, the objectives of the research remain constant and are shown below:

Figure 1. SDI Objectives

SDIO OBJECTIVES

- Conduct Vigorous Research Program To Develop Key Technologies For Defense Against Ballistic Missiles
- Consider Options To Increase The Contribution Of Defenses To US And Allied Security
- Protect Options For Near-Term Deployment Of Limited Ballistic Missile Defense
- Carry Out Program In Full Consultation And, Where Appropriate, With Participation Of Our Allies

The SDI budget request is $5.6 billion and $6.7 billion for fiscal years 1990 and 1991, respectively. The following charts provide details.

Figure 2. FY 1990-91 Budget Compared To Past Appropriations

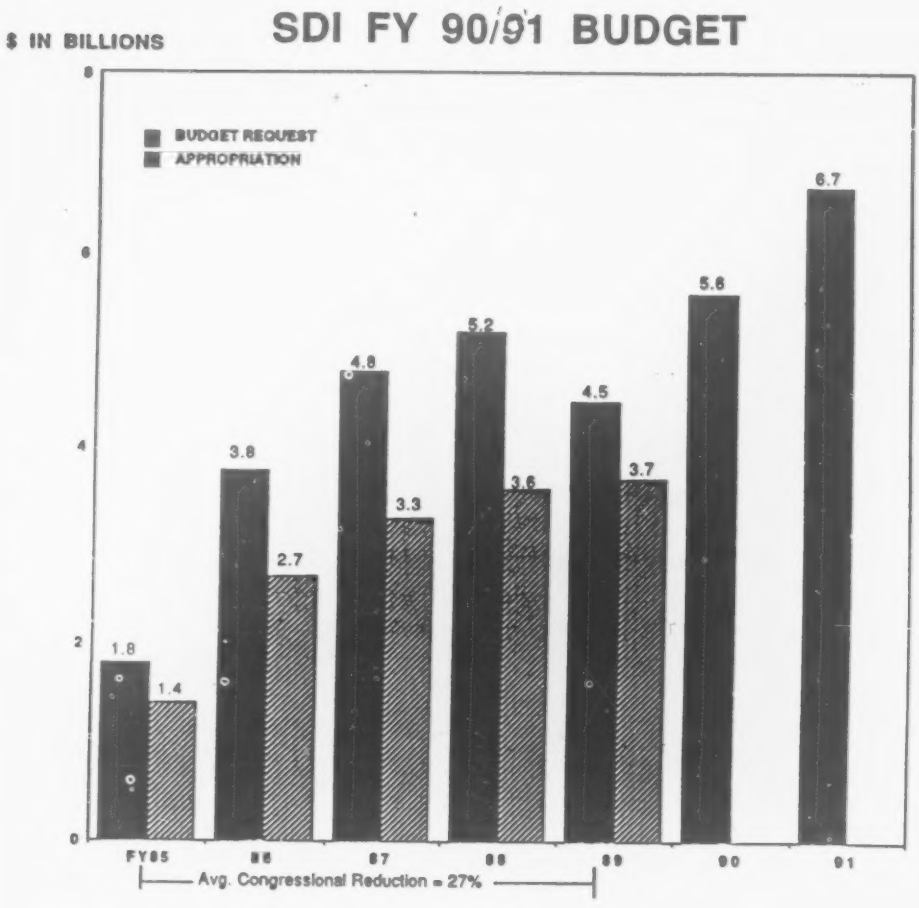

Figure 3. SDIO RDTE Funds by Program ($ million)

	FY86	FY87	FY88	FY89	FY90	FY91
Sensors	844	923	935	1101	1281	1436
Directed Energy	796	853	934	820	1117	1323
Kinetic Energy	596	723	773	773	1346	1534
Systems Analysis/ Battle Mgmt	212	386	461	506	781	976
Survivability, lethality, and Key Technology	214	375	430	406	777	948
Boost Surveillance and Tracking System - Full Scale Development					262	427
HQ MGT	13	20	20	21	26	27
Total	2675	3280	3553	3627	5590	6671

Figure 4. SDIO Budget Request Compared To Other Accounts

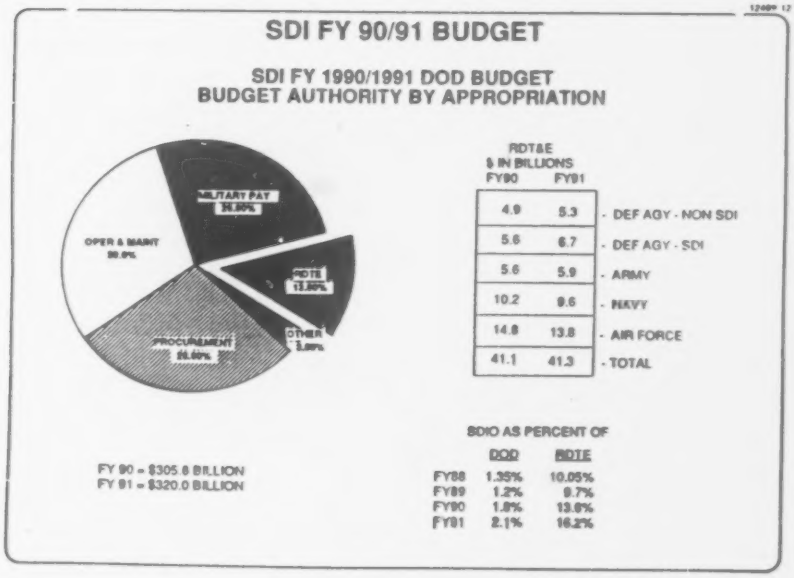

Figure 5. Distribution of SDIO Funds by Project

PE #	PROJECT #	TITLE	FY88 $ Actual	FY89 $ APPN	FY90 $ Request	FY91 $ Request
0603238C		Surveillance, Acquisition, Tracking, and KE Assessment Projects				
	01	Radar Discrimination and Data Coll	16.557	21.178	29.066	29.063
	02	Optical Discrimination and Data	99.679	119.084	123.822	163.747
	03	Microwave Radar Tech	17.288	14.363	29.066	29.063
	04	Laser Radar Tech	79.960	83.771	93.652	101.299
	05	Passive Sensor Tech	65.841	71.280	93.064	105.642
	06	Signal Processing Tech	65.132	91.048	103.048	103.827
	07	Innovative Discr Tech	35.141	13.060	37.041	41.552
	08	Boost Dsm/Vid	173.099	235.000	67.511	0.000
	09	Midcourse Dsm/Vid	27.748	107.098	169.764	314.816
	10	Midcourse Experiment	68.701	66.091	42.060	29.063
	11	Terminal Dsm/Vid	58.092	72.380	144.475	180.343
	12	BATKA Support	117.216	132.880	217.548	214.114
	81	IS&T	58.374	47.389	96.605	114.696
	82	Delta Star	7.800	6.800	6.800	6.800
	83	Support Programs	49.810	91.881	92.092	96.816
		TOTAL BATKA	994.999	1168.735	1391.822	1439.000
0603221C		Directed Energy Projects				
	20	FEL	172.088	208.392	276.092	268.010
	21	ATP	282.348	168.691	284.817	244.810
	22	CL	160.080	160.139	246.486	511.190
	23	NPB	160.016	69.598	114.889	114.706
	24	MIRACL/T	27.800	4.000	6.000	6.000
	25	CDTE/Imaging Tech	167.142	66.153	64.729	62.462
	81	IS&T	19.315	18.000	34.130	40.966
	82	Delta Star	66.218	72.562	0.000	0.000
	83	Support Programs	21.810	40.894	27.089	17.274
		TOTAL DEW	994.295	819.789	1116.892	1322.877
0603222C		Kinetic Energy Projects				
	30	Space Systems	168.000	132.000	248.388	260.412
	31	Exo KKV Systems	116.000	202.388	244.225	253.819
	32	Endo KKV Systems	108.280	146.875	216.564	191.488
	33	Advanced Tech Weapons	117.802	89.106	217.673	211.807
	34	Test and Evaluation	132.105	69.015	107.137	148.683
	35	Technology Support	8.888	9.405	9.596	9.545
	42	Theater Defense	67.966	75.787	139.290	149.967
	81	IS&T	23.345	21.702	41.277	49.190
	82	Delta Star	6.147	0.000	0.000	0.000
	83	Support Programs	32.102	39.967	22.467	32.974
		TOTAL KEW	772.167	773.111	1346.814	1534.867
0603223C		Systems Analysis and Battle Management Projects				
	40	SDS Engineering and Support	72.990	82.088	131.407	201.071
	42	Theater Defense	80.900	20.805	46.922	46.720
	43	CC/SDIT Technology	64.305	88.572	86.388	107.817
	44	CC/SDIT Experimental Systems	91.072	74.179	143.776	203.071
	45	National Test Bed	77.713	100.179	119.827	121.802
	46	SDS Phase I Engineering	46.301	60.470	125.210	156.331
	47	Test & Evaluation	9.661	9.477	9.995	14.977
	81	IS&T	12.988	19.380	28.932	30.802
	83	Support Programs	22.962	63.289	70.998	70.871
	85	Technology Applications	16.488	20.277	22.967	22.965
		TOTAL BA/BM	481.489	505.476	760.884	975.627
0603224C		Survivability, Lethality, and Key Technology Projects				
	50	Systems Survivability	91.305	102.991	169.480	218.114
	51	Lethality and Target Hardening	68.641	62.218	134.434	152.129
	52	Power and Power Conditioning	97.204	99.509	205.295	236.979
	53	Space Transportation and Support	79.539	85.000	134.809	164.750
	54	Materials and Structures	34.990	30.731	69.438	86.051
	55	Countermeasures	21.245	22.270	34.984	42.386
	81	IS&T	33.900	19.376	40.906	48.610
	82	Support Programs	23.131	15.348	9.472	8.578
		TOTAL SLKT	429.574	408.343	776.787	947.576
0604222C	80	BSTS FSD	0.000	0.000	262.000	427.000
0605998C	80	Management Headquarters	20.025	21.000	25.294	27.456

The classified FY 1990 Report to Congress on the SDI Program was submitted to the Congress on January 19, 1989. The unclassified version of that report should be available soon. This report describes in detail the content of the total SDI research program. With your indulgence, I would like to take a few minutes to highlight some very important points from the report. First, the SDI research program seeks both mature and emerging defense options. For example, kinetic energy systems (e.g., rocket-propelled interceptors) -- which will be deployed in the initial phase of a defensive system -- and directed energy weapons (lasers, particle beams) are being researched with equal dedication. Second, the emerging defense options are integral to the program's success in countering potential Soviet responses to a deployed Strategic Defense System (SDS).

In October, 1988, the Defense Acquisition Board (DAB) completed an annual progress review of the technologies previously selected for the demonstration and validation phase of the Defense Acquisition Process. These technologies, constituting Phase I of the Strategic Defense System (SDS), are ground- and space-based sensor systems, ground- and space-based ballistic missile interceptors, and Battle Management, Command, Control and Communications.

Prior to development and deployment, any SDS must demonstrate an ability to meet the requirements of military effectiveness, survivability, and cost effectiveness. The focus of the research into SDS/Phase I elements is to develop Phase I technologies which can meet these requirements. We are encouraged by our progress.

Cost reduction has long been recognized as an important component of the SDI program, and cost-reduction efforts have been emphasized in tandem with technology research. By anticipating potential SDS costs, and by implementing technology development strategies that focus on reducing costs, we believe the SDS will be affordable. As Lieutenant General Abrahamson testified last October to the joint committees on Armed Services, the current estimate of the total cost to demonstrate, validate, develop and deploy the first phase of a SDS is $69 billion. This figure is a substantial cost reduction from earlier estimates, and we expect even further reductions as architecture refinements, new manufacturing techniques and other improvements are made. The reduction to $69 billion was achieved largely through eliminating unnecessary redundancy, increased space-based interceptor performance (resulting in the need for fewer interceptors), and from more capable sensor technology and design. We will continue efforts to both develop systems which are cost effective and seek trade-offs where possible to reduce overall investments.

I would like to review for this Committee the major, mature technologies/system elements which could make up an effective defensive system. The hardware specifications for such an initial defensive system, Phase I, are not absolutely fixed; as continued progress is seen in the demonstration/validation effort, and in technology development, we may substitute or add more promising technology.

SENSORS

Boost Surveillance and Tracking System (BSTS). The BSTS is a missile launch warning system to detect launches of ICBMs and SLBMs. The sensors in BSTS satellites detect and track infrared emissions of a missile's propulsion system. Technology programs, ground demonstrations, and measurement programs are in process and focus on developing a complete understanding of the phenomenology and system design requirements. Ground demonstrations are scheduled to support both a system design selection and a full scale development decision in mid-year 1990. Currently, two contractors are finalizing their individual system design concepts. The first BSTS deployment is planned for the mid-1990s.

Space-Based Surveillance and Tracking System (SSTS). The SSTS is a constellation of satellites and ground stations. The primary sensing payloads of the satellite are a Long Wave Infrared (LWIR) passive sensor and a visible/ultraviolet passive sensor. The primary mission of SSTS is to track Post-Boost Vehicles (PBVs), target clusters, and Anti-Satellite Weapons (ASATS) to support defensive weapon engagement. The SSTS will also be able to track and discriminate a small number of RVs and perform foreign target signature collection and satellite tracking functions. The SSTS may provide weapon target assignment, fire control and inflight updates for Space Based Interceptors during post boost and early midcourse phases of flight. Initial design validation will be accomplished by an end-to-end ground demonstration scheduled for 1992 and will be the basis for downselection to a single contractor who will

produce the satellite.

Ground-Based Surveillance and Tracking System (GSTS). The GSTS is a fast-response, two stage, rocket-launched long wavelength infrared (LWIR) sensor system boosted into suborbital flight for use in the midcourse phase. The GSTS sensor operation is integrated with SSTS and GBR operations to provide track and discrimination. GSTS sensors are launched on selective trajectories based on early attack assessment data provided by the BSTS, SSTS, and other early warning sensors. The GSTS sensors would not be committed until the threat is launched to provide best GSTS inventory usage to increase the overall effectiveness of the SDS. GSTS enhances strategic defense robustness by providing a reconstitution capability in the event of an SSTS outage, to fill gaps in SSTS coverage, and to augment SSTS viewing in high density traffic situations.

A single contractor is developing concepts and multiple sensor designs. Sensor design will be selected based on technology experiments and sensor test bed results. A flight-qualified payload design will be developed and then fabricated for hardware-in-the-loop ground test demonstrations in FY92.

Ground-Based Radar (GBR). The Ground-Based Radar -Experimental (GBR-X, formerly named the Terminal Imaging Radar) is a phased-array, technology demonstration radar to be used for experiments at the U.S. Army Kwajalein Atoll for multi-target acquisition, tracking and discrimination in the midcourse and high endoatmospheric phases. It will accept hand-over from other midcourse sensors. The previous radar design was modified

in 1988 to operate in the midcourse region. This design facilitates integration with both ground and space based interceptors. The follow-on Ground-Based Radar program will develop a tactical, late midcourse defense radar to meet the ballistic missile threat, as an deployment system option for the SDS.

DEFENSIVE INTERCEPTORS

Ground-Based Interceptor (GBI). The GBI is an exoatmospheric interceptor to perform preferential and adaptive defense of selected targets. A Demonstration/Validation flight test series is intended to demonstrate, in FY 90-91, a LWIR seeker against a representative target complex (including decoys and countermeasures). Preparations are being made to develop and integrate the advanced technology required for engineering development. We plan to flight test these technologies in the 1991-92 time frame.

Space-Based Interceptor (SBI). SBI obtains the maximum defense leverage by intercepting boosters and post-boost vehicles before they have a chance to deploy reentry vehicles and clouds of decoys. SBI also has the additional capability to intercept re-entry vehicles and anti-satellite weapons, as the threat changes, with increased defensive benefits. Although the present architecture calls for SBIs to be garaged in groups of ten, the interceptors could be deployed as free flying "singlets" as proposed in the "Brilliant Pebbles" concept, with modification to battle management and surveillance requirements.

Technology simulation and tests are in progress to support the optimization of a low cost SBI. In particular, hover

testing at Edwards Air Force base and Sensor/Sensor Processor testing at Eglin Air Force Base in FY89 and FY90 will investigate the bounds of interceptor performance. These ground tests will be augmented, in the FY90 to FY92 period, with ballistic tests of SBI subcomponents at the White Sands Missile Range. In FY93, ballistic intercepts will be conducted at the Kwajalein Missile Range. These tests will complete preparation for a Full Scale Development Decision in FY94.

BATTLE MANAGEMENT/COMMAND, CONTROL, COMMUNICATIONS

This component has been designated the Command Center/System Operation and Integration Functions (CC/SOIF). The Command Center element will provide positive, survivable, and secure human control over the SDS. It will consist of fixed and mobile units and a terrestrial communications network with ground entry points for interconnectivity to the space components. CC also supports coordinated offense-defense operations and interfaces with other U.S. government agencies.

The System Operation and Integration Functions include the distributed information processing network needed for the automated execution of a human-selected battle plan. This requires both the assured, secure exchange of information between the CC and all SDS elements, and the data processing to identify targets, allocate weapons, execute the defense and assess its success, and manage the system's resources.

A baseline CC/SOIF architecture has been identified, with automated decision functions allocated to interceptor and sensor elements. Software policy, based on the recommendations of the Defense Science Board, emphasizes standardization,

supportability, risk reduction, security, reusability, and documentation.

In the coming year, the CC/SOIF program will:

- Develop a pilot Command Center experiment to resolve issues,

- Develop and refine Sensor Planning Algorithms for the Phase I design,

- Conduct advanced CC/SOIF simulations to test integrated system operations,

- Refine the content of ongoing experimental activities,

- Accelerate the use of available data from multiple experiments.

An Experimental Version of the CC/SOIF element should be available in FY 1994, with prototype CC/SOIF participating in realistic integrated tests with other SDS elements beginning in FY 1996.

ADVANCED TECHNOLOGIES.

Subsequent deployments, necessary to maintain and improve the initial defensive system capability, may include some or all of the following major candidate systems, depending on the threat response and the technological progress. Or, if more promising, one of these could be moved to the initial phase. There are still many unknowns associated with these technologies and a significant investment is necessary to resolve the unknowns.

Singlets. The concept of a singlet, in which the total surveillance is built into the interceptor, is embodied in a concept called Brilliant Pebbles. This interceptor would be

completely autonomous. Given a release command, the interceptor would use its own sensors to acquire a target and engage it without external tracking data or other assistance.

The interceptor should be low cost because it is derived from pervasive use of miniaturized commercial and military "off-the-shelf" high technologies, including miniaturized high-resolution/wide-field-of-view video imaging systems that work from the mid-UV to the mid-IR range, a super computer with Cray-I performance operating off high-energy-density "D-cell" sized batteries, a miniaturized high-power laser imaging radar/communications system, and a high-mass monopropellant propulsion system.

This interceptor's passive features -- small size, low cost, autonomy, and dispersal ability as singlets -- would be jam resistant, provide low-detection cross section, enable interceptors to be supplemented by decoys, and provide low value per individual target. These features would be supplemented by a full nuclear survivability suite and extensive maneuver capability for breaking track, evasion, and antisimulation in conjunction with constellation decoys.

High Endoatmospheric Defense Interceptor (HEDI). HEDI is a hypervelocity missile with a non-nuclear warhead that provides endoatmospheric (terminal phase) defensive coverage against ICBMs and SLBM RV's. The contribution of HEDI to the SDS architecture would be an additional defensive layer to further reduce RV leakage rates. The HEDI research is focused to resolve technology issues dealing with aero-optical effects, window and forebody cooling, shroud removal, non-nuclear warhead

kill and guidance and controls. The FY90 request supports the second major flight experiment (KITE-1) in which the IR passive seeker will be demonstrated, and several key ground tests to obtain significant optical and thermal data. The HEDI project is probably the most mature follow-on element and could enter into Demonstration/Validation (a Milestone I decision) in FY 90, if required.

Neutral Particle Beam (NPB). Orbiting stations would produce beams of neutral particles sufficient to destroy boosters and reentry vehicles, and provide interactive discrimination between warheads and decoys. A Milestone I decision is planned in the early 1990s, with a Milestone II decision in the mid-1990s.

Space Based Laser. Orbiting stations would produce laser beams sufficient to destroy boosters, post-boost vehicles, provide interactive discrimination, and provide self-defense capability for SDS elements. A Milestone I decision is planned for early 1992, with a Milestone II decision in the mid-1990s.

Ground Based Free Electron Laser (GBFEL). Protected sites in the United States would produce high energy laser power, relayed through space by mirrors, sufficient to destroy boosting missiles and to provide interactive discrimination. A Milestone I decision is planned for the early 1990s, with a Milestone II decision in the mid-1990s.

There are many other components of the SDI research effort, each with a supporting series of technology base research and experiments. Examples are the many sensors, processors and control elements associated with the sophisticated acquisition,

tracking, pointing and fire control necessary to orchestrate the multiple autonomous functions of the directed energy systems. We have attempted to detail in the Report to Congress the complete extent of the research.

The Report to Congress on the SDI program also contains information regarding SDI's compliance with the ABM Treaty. As has been the case since the SDI program inception, planned tests and experiments for fiscal years 1990-91 are in full compliance with the ABM Treaty. All tests are reviewed in detail by the Department of Defense (DoD) Compliance Review Group to assure such compliance. This review process is a deliberate, vigorous study of plans and treaty consideration.

Last year's Defense Authorization Act (Section 224) required a report on the feasibility of an accidental launch protection system. As you are aware, the Administration is conducting a comprehensive strategic review. The Department is very actively involved in that review, which includes consideration of the optimal SDI program. The Report on ALPS will be submitted as soon as possible upon completion of that review.

I would like to touch briefly on one other item before I proceed to highlight our technical progress this past year. You may be aware that the SDI research involves our Allies. The President's original guidance and SDI's charter reflected a concern for both U.S. and Allied security and stressed the development of ballistic missile defense technologies for threats of all ranges. Most of our Allies support the SDI research effort and, within the established DoD competitive

contracting procurement procedures, are actively participating with valuable technical contribution to the program. Since, SDIO's mandate extends to examining technologies for theater missile defenses, the Fiscal Year 1990 program will include analyses, technology developments and experiments that will improve our understanding of the theater defense problem. Technical programs include hypervelocity gun experiments, radar analyses, lethality studies, and theater test bed development. In several cases, our Allies are working cooperatively with us as we proceed in this area. A notable experiment will be the U.S./Israeli missile engagement experiment titled ARROW.

SDI research accomplishments have increased our confidence that strategic defenses will prove feasible. In past years, the SDI Organization has conducted a series of kinetic energy and directed energy weapon technology tests. Kinetic energy tests have successfully demonstrated the capability to intercept and destroy -- by non-nuclear means -- enemy ballistic missiles before they reach their targets. The first of a series of "hover tests" of a space-based interceptor have been conducted in a ground test facility. These tests help evaluate the capability of fast acting thrusters to keep a sensor pointed at a target, and the interaction of the sensor and guidance systems. This past year the Aerothermal Reentry Experiment (ARE) demonstrated that kinetic energy weapons can destroy warheads not only with a perfect hit, but also by inflicting damage with a less than perfect collision. ARE demonstrated the process of self-destruction of a damaged warhead as it enters the atmosphere. We will continue work over the next two years

toward integrated flight tests which will demonstrate with sufficient confidence that ground-and space-based interceptors can in fact satisfy the requirements for the first phase of a defensive system.

With directed energy experiments, researchers have demonstrated several key principles related to the operation of a large Free Electron Laser, a weapon which could become powerful enough to destroy enemy ballistic missiles in the boost and post-boost phases of flight. The Free Electron Laser has demonstrated lasing which shows wavelength scaling beyond that needed for an operational defense system. Similar experiments are also being conducted using other types of lasers and neutral particle beams. While lasers and particle beams will not be available as soon as some of the kinetic energy systems, their importance to the overall SDI mission cannot be overstated. Although such systems would build on the capability of an initial system, they would have at least one new mission: to thwart the effectiveness of a new generation of Soviet ICBMs and other possible counters to an SDS. Kinetic energy systems, lasers, and particle beams form what might be considered a mutually reinforcing "triad" of defensive systems much like the mutually reinforcing and complementing aspect of the offensive Triad. Additionally, by following the system design approach which we call "branch and block," we can frustrate threat evolution by maintaining an ever present capability to expand the SDS to meet the threat.

We have continued to exploit the successes of earlier experiments which demonstrated substantial improvements in our

ability to develop sensors necessary for strategic defenses. Last year's DELTA 181 experiment provided valuable information on the signatures of midcourse targets. The assortment of active and passive sensing instruments accurately characterized the test objects, and also the launch of a research rocket, in a variety of space environments. This data is being used to develop effective algorithms for discrimination between decoys and reentry vehicles.

Some surveillance and sensor technologies supported by the SDI program address not only SDI but other critical national security needs as well. The capabilities of today's early warning radars and satellites could be greatly improved through advancements in detection capabilities. New sensors will provide more accurate and reliable surveillance data of objects in space.

Tangible, impressive results have given us increased confidence that strategic defenses are feasible. Our progress has been excellent but we still have much left to do. Unanswered technical issues exist even though we are making great strides in fully understanding strategic defenses. The principal uncertainties of ballistic missile defense have been recognized for several years; these center around three issues: 1) assured survivability of space-based elements, 2) early interception of boosters and post-boost vehicles, and 3) discrimination. We have programs actively pursuing resolution of each of these issues.

Our schedule for the next two years includes a number of very important tests and experiments. Again, each of these is

fully compliant with all treaty obligations. I would like to briefly highlight a few upcoming projects and experiments, their contribution to the research program and the issues which will be addressed (from the three listed above).

Experiment	Objective	Issues Addressed
Delta Star	Collect multispectral imagery of rocket plumes and the near-space environment.	2, 3
Beam Experiment Aboard Rocket (BEAR)	First test of a Neutral Particle Beam in space.	1, 2, 3
Laser Atmospheric Compensation (LACE), Relay Mirror (RME), Experiment	Space test of relay mirror and atmospheric compensation process for ground based free electron laser.	1, 2
STARLAB	Space test of tracking/ pointing, sensor and communication technologies.	1, 2
Space Power Experiment Aboard Rocket (SPEAR) II	Space test of high power electricity applications.	2
Airborne Optical Adjunct Infrared Experiment	Airborne test of LWIR sensor.	2, 3

The budget request supports both Phase I and technology for follow-on phases. Phase I elements are currently in the Demonstration/Validation phase of the Defense Acquisition process and will enter Full Scale Development in the next 3-4 years. This system will support the minimum requirements, established by the Joint Chiefs of Staff for a strategic defense system that has military utility. Subsequent phases will build on that system, as necessary, to maintain military utility.

I am happy to answer any questions you may have.

MOTION TO CLOSE

Mr. MURTHA. Mr. Dicks?

Mr. DICKS. I want to welcome you, General Monahan, to the committee and I would like to make a motion.

I move that the hearing today, March 23, 1989, and those portions of the hearings scheduled for April 4, 5, 6, 11, and 12, which involve classified material, be held in executive session because of the classification of the material to be discussed.

In addition, I move that the transcripts and related materials developed in the intelligence hearing be handled in accordance with the Appropriations Committee's special interim procedures for portection of intelligence information.

Mr. MURTHA. The clerk will call the roll.

[The clerk proceeded to call the roll.]

Mr. MURTHA. Madam Reporter, let the record show that on this vote Mr. Murtha, Mr. Dicks, Mr. Hefner, Mr. AuCoin, Mr. McDade, Mr. Miller, and Mr. Livingston voted aye.

Seven members having voted in the affirmative, this hearing is now closed.

Mr. MURTHA. Mr. Dicks?

SDI OVERALL POLICY

Mr. DICKS. Thank you, Mr. Chairman.

General, I want to welcome you in this new responsibility. I want to say one thing that I feel very strongly about. I think that a program of the importance of the SDI requires strong leadership at the top. I certainly expect and think you will be this kind of a leader. But in the past, I have worried a great deal about this program being politicized. I said this to General Abrahamson when he was running the program. It seems to me that one of the most important things is that we have good factual information, that we don't get swept up in ideological pursuits in terms of trying to sell this program on Capitol Hill.

The person who I have always felt was the model of that kind of objectiveness and integrity was Mr. Robert Inman, who was the head of the National Security Agency and number 2 at the CIA.

I believe that on a program of this kind of national importance, that it is important and critical to the success of what you do for this to be objective without political overtones. I know you. I know your reputation. I just hope that in your management of this program, that we can call on you for a clearcut, objective answer that is going to be free of political overtones.

General MONAHAN. That would clearly be my objective also.

In the Air Force, we tell our program managers that we don't want them to be program advocates. We want them to be objective managers of the program. Obviously you can't be completely divorced from that because just in giving advice and by being very close to the program sometimes people will ask your opinion; should we do this or that? So, there would be times when perhaps the program manager would have to step in there. The most important factor, I think, is that my staff and I try to provide the very best objective assessment of technical feasibility, of what it costs to do the program and how long it takes. One thing that is encourag-

ing to me is the strategic review that is underway in the Pentagon. I hope that what comes out of the review is going to be an integrated assessment and evaluation of the strategic modernization situation and what role should offense and defense play. Coming from that will be, hopefully, one single program which all of us in the Department of Defense can support on an across-the-board base. I would support the offensive part as much as I would support the defensive part. It will be a program for which we all have a very solid front. Within the SDI office, we have to provide to you and to all of our leadership the best objective assessments we can.

Mr. MCDADE. Would you yield?

Mr. DICKS. Yes.

Mr. MCDADE. I want to welcome General Monahan in front of the committee in his first appearance in a new assignment.

You are no stranger to this committee. My experience, General—I remember vividly programs that had a lot of advocates that were in difficulty for a technical or cost reason and if they were, we got straight answers about how the program was working.

Your past performance in front of this committee would auger well for your new assignment, which is a tremendous one, and we look forward to working with you.

Mr. DICKS. The chairman and I am both interested in knowing the time frame for completion of the strategic review within the Pentagon.

General MONAHAN. I don't have the precise time frame. We have been working on it so diligently now for the past few weeks. I think most of the basic ingredients are there at the present time. I think most of the review within the Pentagon will wrap up just within another week or two. From there on, though, after it leaves the Pentagon, I don't know what the schedule might be. Hopefully we are within a month or two.

NITZE CRITERIA

Mr. DICKS. One general question. Many of us felt that the so-called Nitze criteria made a considerable amount of sense. We wanted to judge the difference between the cost of an increment of offense and defense, we wanted to make certain that this system would be survivable and that it would add to our national security.

How do you feel generally about that criteria in terms of this program?

General MONAHAN. I think the criteria is right on the money. I think we should observe it and, indeed, we intend to do so.

SDI FUNDING LEVELS

Mr. DICKS. When the Nitze criteria was first laid down, some senior officials at the Pentagon wanted to amend or change it. I am glad to hear that you feel that criteria is still relevant. I think it is a good way to judge the program.

One of the complaints raised by General Abrahamson in his "End of Tour" memo was that the SDI program was selected to be technology limited, but that Congress consistently voted less funds than were required to complete such a program.

Is it your view that funding levels for SDI should be limited only by what is technologically possible, or should it be evaluated in light of other pressing defense requirements within increasingly tight budget constraints?

General MONAHAN. As I said earlier, what I like about the strategic review that is underway is that we are looking at all elements of strategic modernization, defense and offense together. I think we need to have a good integrated assessment and put together what is affordable. Is it true that SDI could move faster with more funds? No question about that.

REALLOCATION OF SDI PROGRAM FUNDING

Mr. DICKS. We used to see changing priorities. There were some technologies that were hot for a while and later, we would see the budget was being shifted around. It seemed we were asked up here not to micromanage this thing, but there was a lot of movement of funds between different accounts as one idea or another was presented.

Is there a way to get a little more stability into this program?

General MONAHAN. I get complaints from the Army and the Air Force in particular where they don't have the financial stability they would like to see for the efforts we have them do. I have told them that I would promise them that I would provide annual financial stability, barring some really unforeseen circumstances, but that each year we would provide the necessary funds, we would do it upfront and then not make adjustments in that as the year progressed.

That is one point.

Mr. DICKS. Do you have a five year plan for this?

General MONAHAN. Yes, sir; we do.

Financial stability in all the elements is one of the objectives that I have for the program.

On the other hand, as I said earlier, we are in the demonstration and validation phase for the Phase I of the program. For technology that supports both Phase I and later phases we are even earlier than that, so, we are in a stage of the program now where a lot of tradeoffs are being made, and where specifications that ultimately will be used to take elements into full-scale development are being developed. The specifications are being developed versus the requirements and the two are traded off on a regular basis. So that says that we need to have the flexibility to make trades between, say, for example, now it makes more sense for SSTS to do this function instead of BSTS, those kinds of tradeoffs. Another example, with SSTS, one of the technical challenges there is the cryogenic cooler and we have three parallel paths that we are pursuing.

———. We may not be able to make it go, so we may have to say let's no longer proceed with that technology, but let's put our money over here.

ARMS CONTROL TREATY CONSIDERATIONS

Mr. DICKS. I think that is good. One moment it is kinetic kill, the next thing it is chemical lasers. There have been some swings in attitude over there. Let's think ahead.

I want to ask you a hypothetical general question. This is a new Administration, an Administration where some of the senior people have written considerably about their view of SDI and how it should play in this overall strategic concept.

What if the answer that came back to you from the President, the National Security Adviser, and the Secretary of Defense is that we have decided that for the moment, we want to continue to do very vigorous research on SDI, but that we are going to do that in compliance with the ABM agreement and we are going to move ahead and try to get a START agreement that would allow us to reduce our strategic offensive weapons and so we are going to have to, for seven to ten years, conduct this program in terms that are compliant with the ABM agreement.

That is one very possible outcome of this review.

How would you then proceed with this program? What would your recommendations be at that point in general terms?

General MONAHAN. In general, first of all, we would have to proceed with what I think are the critical technologies associated with this program, such items as pointing and tracking, sensor technology, and do the technology work such that we could mass produce some satellites in the future.

I would continue to do work in simulation of various architectures for the program and that would mean continue to fund the National Test Bed.

I would also proceed with the work on the Brilliant Pebbles concept because I think that we would be able to do that in an affordable way and do the technology effort such that we would answer a lot of the unknowns that we have at the present time.

TRANSPORTATION REQUIREMENTS

Mr. DICKS. What about the lift issue? Is that something we need today?

General MONAHAN. That one I would have to look at very, very carefully.

[CLERK'S NOTE.—Classified discussion removed.]

FISCAL YEAR 1989 PROGRAM ADJUSTMENTS

Mr. DICKS. In executing the appropriated level of funding for fiscal year 1989, what principles were followed by SDIO in applying adjustments from the original request?

General MONAHAN. We wanted to make sure that we continued to pursue Phase I. Phase I of the program had just been approved by the DAB in the October time frame of last year. We wanted to protect options for a limited protection system, should anybody care to do so, try to keep the proper balance between science and technology. In doing that, I think we made some good equitable distributions and reductions. One area took a bigger hit than others, the one we call Survivability, Lethality and Key Technologies. That took a heavier hit because we reduced a lot of the funds that were going into an Advanced Launch System. We don't have the crying need for an Advanced Launch System right now so that turned out to be a lower priority so we did take a bigger hit in the SLKT element.

Mr. DICKS. One of the concerns originally expressed by the House was a desire to balance work devoted to Phase I technologies with work on follow-on technologies.

The objective was to make sure that we did not produce a situation where we committed ourselves to a Phase I system that was soon overwhelmed by a responsive threat, but that follow-on technologies were not available to counter the responsive threat because funds were diverted to implement phase I.

Was there a specific effort to maintain an appropriate balance between the technologies in applying the fiscal year 1989 reductions and in formulating the fiscal year 1990 and 1991 requests?

General MONAHAN. Yes, indeed; there was.

OVERALL FUNDING LEVEL FOR FISCAL YEAR 1990

Mr. DICKS. The Subcommittee has asked all program representatives the potential impact of further reductions in the defense spending number for fiscal year 1990.

There is talk of a figure that would mean an additional $10 billion cut in defense budget authority. Sequestration would require a cut below President Bush's figure of some $27 to $33 billion, depending on whether personnel was exempted. In such an eventuality, is it your position that SDI should be exempted from any reductions?

General MONAHAN. As I said, those decisions have to be made among a large body of people in the Pentagon and finally in the Administration. We provided the number of options, worked on them with other people from staff. We provided the financing, the content, all of that that goes with it. Obviously those of us that are close to the program would like to see us proceed the way we are going, no queston about that. On the other hand, we have provided wide range of options.

Mr. DICKS. As you know, there is considerable discussion about a $4 billion program up here. What would happen if this money was reduced, say, to a flat level of $4 billion for the next several years?

General MONAHAN. Then you are down to a technology-only program. I don't see any way that we would be able to field any systems. With the possible exception that we might be able to take the Brilliant Pebbles into full-scale developoment, but we don't know enough about that particular effort. It is so early at this time.

BRILLIANT PEBBLES

Mr. DICKS. Could you talk just generally about Brilliant Pebbles?

General MONAHAN. Be happy to. First of all, it differs from the Phase I program in two respects. It is a new architecture in that Brilliant Pebbles has at least one mode of operation which is autonomous.

Brilliant Pebbles is indeed something that is very similar to an air-to-air missile. We call it a Space-Based Interceptor. ———. It would have on-board a sensor suite that consists of an ultraviolet sensor ———.

Mr. MURTHA. This is one——

General MONAHAN. Yes, sir, and what you see right there also would be a satellite.

In other words, rather than deploy Space-Based Interceptors in groups of 10 or more, we would deploy them as singlets, each by itself.

[CLERK'S NOTE.—Classified discussion removed.]

General MONAHAN. Distinguish by where they came from. Each one of these is looking at a certain area of the earth.

Mr. MURTHA. The time of the gentleman has expired. Mr. McDade?

Mr. MCDADE. Thank you, Mr. Chairman. I just want to go back to that colloquy. Give us the distinction between the current system and the Brilliant Pebble concept that Livermore has now apparently suggested to you as an alternative.

General MONAHAN. Yes.

Mr. MCDADE. Tell us what your current thinking is which gets you to the Space-Based Interceptor. Here you have the Brilliant Pebble concept.

Would you go through that, please?

General MONAHAN. Yes, sir.

First of all, the current program in Phase I relies on two sensors: the BSTS, a Boost Surveillance and Tracking System, and SSTS, the Space Surveillance and Tracking System, to provide inputs to the Space-Based Interceptors.

SBI's do not have capability to detect missile launches in phase I. They have to get that information from someplace else. They have infrared sensors that when they are told where a target is, they can home in and destroy that target. So the Space-Based Interceptors do not have autonomous capability. Also, they are housed in a carrier vehicle that contains ten of the Space-Based Interceptors. So, first of all, it does not have autonomous capability, does not detect the launches; and second, they are normally housed in groups of ten, although that could perhaps be altered. They rely upon communication and battle management command and control-type information from other sensors.

Mr. LIVINGSTON. If the gentleman would yield, is the tracking done from the vehicle or from the gound or from elsewhere?

General MONAHAN. The initial tracking is done by the Boost Surveillance Tracking System and that is handed over to the space surveillance tracking system.

Mr. MCDADE. It relies on the system on page 12?

General MONAHAN. Say that again.

Mr. MCDADE. I am looking at page 12 of your handout, the major elements of the BSTS—from the BSTS to the SSTS down to the interceptors housed in the—what vehicle are they housed in?

General MONAHAN. They are housed in what we call a carrier vehicle that in itself then is a satellite.

Let me explain. The BSTS and the SSTS are the two sensors that give the SDI the command and control information that it needs.

BSTS PROGRAM

Mr. MCDADE. When you get over to the concept of Brilliant Pebbles, are you eliminating, therefore, BSTS and——

General MONAHAN. That is an option that is available. I would think that we probably would not eliminate both of them. I will

tell you why. First of all, BSTS is in an orbit that is geosynchronous. If you look on page 15, you will see what the coverage to the earth is. It has the capability of looking, each one of them, at half the earth. We would plan to have six of them established up there in a constellation. The BSTS can detect missile launches with ———. What is different about BSTS from today's DSP satellites? It should be able to detect ———.

Mr. McDADE. Take that to today from DSP; what do you get?

General MONAHAN. ———.

Mr. McDADE. Under today's system, how long before the President gets that information and how long with BSTS?

General MONAHAN. I don't know what it is under the present system. The BSTS, we are going to know about it ———.

Mr. McDADE. I don't want to get sidetracked into that issue as important as it is. Go ahead with the decision between the two systems.

BRILLIANT PEBBLES

General MONAHAN. Okay. So again back to the decision. The Brilliant Pebbles would not rely upon the BSTS for launch information. Brilliant Pebbles, because they would be up circling the earth in an orbit that would include many, many ———.

Mr. McDADE. ———?

General MONAHAN. ———. The numbers are not determined as of this time. But that is something that would have to come later.

If you look at page No. 30 of the handout, there is a good depiction of the orbit that Space-Based Interceptors would be in. It is also useful to describe Brilliant Pebbles. You will note this area of coverage ———. That shows the surface of the earth that could be covered approximately by Brilliant Pebbles. ———. But the Brilliant Pebbles would detect the launch of a booster; it would report back to our command center that it has seen a launch, and then ask for permission to attack.

So it has the capability of surveillance and attack both built into it. By deploying them in singlets, you don't need the carrier vehicles so you keep things relatively small and compact.

Mr. McDADE. It sounds incredibly expensive.

General MONAHAN. I can't give you a very precise cost estimate as of this time. By comparison with the concepts we looked at in the previous Space-Based Interceptor studies, I think that it could be quite less expensive.

Mr. McDADE. What is the key to that? You talked about it having the capacity of a Cray computer.

General MONAHAN. Capacity is not the right word. It has the throughput capability ———. It can do the work as fast as a Cray computer. The other thing about Brilliant Pebbles—

Mr. McDADE. That work would be equivalent to the ———.

[CLERK'S NOTE.—Classified discussion removed.]

SDI PROGRAM STATUS

Mr. McDADE. I would like you to summarize where this program is, give us the highlights of where you believe the program is and then give us the highlights of where you think the Russians are,

what it looks like from our perspective and theirs. I would like to have that overview.

General MONAHAN. I would be happy to do so.

First, where is our program today. As you recall—there is a chart in the handout that would perhaps help explain that—if you looked at chart No. 9, it shows an SDS program schedule that came out of the October, 1988, DAB. That shows by looking at the various three major elements of Phase I, the sensors, the command and control, and the initial interceptors that are in the demonstration validation phase, at the present time, if you look under fiscal year 1989, the solid black bars, that is leading up then to start a full-scale development of these three major sections of Phase I indicated by the cross-hatched bars there, and you will note that in the sensors full-scale development would start in fiscal year 1990.

The first sensor is the BSTS sensor. Others then would start full-scale development in 1992. And the full-scale development of command and control starts in 1992, and finally for the Space-Based Interceptors and Ground-Based Interceptors, in the 1993 time frame.

So we are at the stage in the program now in which a lot of trade-offs are being made. We have not firmed up on specifics before going into full-scale development. We haven't selected the contractors to take things into full-scale development. We will have competitions to do so. So we are still early on. It is when you get into full-scale development that the program has a lot more rigidity. At that time you will want to redirect it as little as possible. You want to fund it in a stable way; if you don't that leads to costly stretch-outs. We plan the first FSD decision for BSTS in September of 1990, so it is right at the very end of the fiscal year with the BSTS.

Now, so we are in the stage that we call demonstration validation with the full-scale document decisions and all of those when you go to full-scale development, we go element by element. Regarding BST and SSTS, we will arrive at separate decisions for each one, and they will be subjected to review by the Defense Acquisition Board, which means we have to have test master plans, threat assessments, a whole list of things, and further cost estimates for each one with a cost effectiveness analysis completed.

So a very rigorous scrub, then, occurs just before you go into full-scale development. That is where we are with Phase I.

You can see where production would start and those are the times at which you could expect deployments, for example, with the initial interceptors. You would start production perhaps as early as 1995 and the first one could be fielded in late ——— somewhere in that vicinity.

SOVIET ABM SYSTEMS

Where are the Soviets? ———. What do we know? We do know that they have the system around Moscow that has 100 interceptors and complies with the treaty. ———.

We can't prove one way or the other, but we don't see concrete evidence.

We think that as far as a ground-based system is concerned, could they expand upon the system that they have around Moscow and is that right having it proliferate throughout the rest of the country? ———. In certain areas, they are ahead of us in a technical sense. They began, for example, the work on particle beams. I hope that we are ahead of them as of this time. I am not sure, but hopefully we could be. They clearly have a lot of work going on with ground-based lasers.

Are they ASAT weapons? Could they be used for strategic defense? ———.

Mr. McDade. ———. I am not as expert on that as I would like to be, but I don't—we could perhaps provide more information on that subject. I am not well versed.

[Clerk's note.—Classified insert removed.]

Mr. McDade. Thank you, Mr. Chairman.

Mr. Murtha. Mr. AuCoin?

OFFICE OF TECHNOLOGY ASSESSMENT STUDY ON SDI

Mr. AuCoin. Thank you, Mr. Chairman.

General, all of us would rather work on a problem that can be solved rather than one that can't, and I don't have any reason to believe that SDIO is any exception. If you see your job as developing a sensor or your job as developing a particle beam, then that is something I think you can have some success at if we give you enough money here in the Congress. But there are some problems, it seems to me, that are many times more difficult than either of those two things. Some of those problems may be insoluble, yet you have to solve them if SDI is going to do the country any good. One of those problems is what happens if the Soviets get an SDI that is comparable to ours, and they use it to strike first, using their so-called defense to attack our defense? This subcommittee in considering that, mandated the Office of Technology Assessment to produce a study both in classified and in unclassified versions, as you know, to deal with that question. OTA put together a panel of some of the best minds on all sides of the issue, and the study was finished last year, and I have read it and reviewed it and I would stipulate that it is a superb piece of work.

But the public doesn't know a thing about it as we meet in this hearing today because your office refused to declassify any significant portion of the key chapters on survivability of SDI. Your office said that even though no specific part of the study contained classified information, somehow the entire chapters have to be classified. In one looks through those chapters that have been blanket classified, one finds nothing in there that the Soviets don't know already or certainly could figure out for themselves, but one in reading it finds a great deal that supports very serious debate on where SDI is going.

So you can't protect the real SDI program from Soviet suppression. You can only protect the program from some aspects of free and open debate in the United States, and unfortunately that is how this country makes its best decisions especially on a program of this magnitude. I think that would be a serious disservice to national security as well as bringing some discredit on SDI itself.

So I want to call this to your attention and ask you to carefully review that issue, the issue that was created with the blanket classification of those chapters, and I would ask you today to make a sincere effort to declassify every sentence that can be declassified from a security basis and promptly get back to the committee on what you find.

Would you be willing to do that, General?

General MONAHAN. Yes, sir.

I was not present when that happened, but from what I can tell the CIA, the Air Force, the DIA were all consulted on that entire report, and these agencies came back and said for the three chapters 10, 11 and 12, that they recommended that they stay classified; in fact, in some cases, they were very insistent. The reason was Chapter 10, for example, contains a lot of information on possible countermeasures. We have a rigorous program of our own that looks at countermeasures and what we might do about people, but we don't like to give anybody any ideas as to the way to do it.

Mr. LIVINGSTON. Would the gentleman yield?

In his question, you want to declassify a lot of material relating to SDI, but in your question, you expressed concern that the Soviets might develop an SDI of their own——

Mr. AUCOIN. The last President of the United States wanted to give the Soviets SDI technology, so that is a far step removed from where my position is.

Mr. LIVINGSTON. Are you concerned that the Soviets would have——

Mr. AUCOIN. My concern—let's not get into an argument. I think we have a case here wherein we have a massive and significant military program, one that requires intelligent debate. Obviously, there is a line beyond which you cannot go in terms of what is classified and what should be classified, but when I read the chapter that I have read where the entire chapter is classified, I think that there has been a step here beyond that which is needed to protect national secrets. How can the American public understand whether SDI makes sense or not if it has no notion whatsoever as to how vulnerable SDI might be to countermeasures? You don't have to be a genius to figure out that if both sides had an SDI, the SDI on the other side could be used in an offensive mode.

It should be a part of the national debate. The taxpayers, if they fund this, will be funding an enormous program, a very costly program. The question is, will it work? Will it be vulnerable? So I am simply asking a review to be made on the question of classifying entire chapters which I think is an overreaching of what is necessary to protect national secrets or to give the Soviets some idea that they might not otherwise develop on their own.

The General indicates that he will review that, because that happened before he was there?

General MONAHAN. I will be happy to review it.

Mr. AUCOIN. This is within the realm of this hearing. Let me read from the Office of Technology Assessment report that I am describing. Maybe the gentleman from Louisiana would like to listen to this.

This is one chapter, one passage from the report. ———. Common logic would lead one to believe if there is an inherent ca-

pability of that sort in any SDI, ours or theirs, I can't understand why that would be classified.

Mr. LIVINGSTON. I am sure the General is far more qualified to respond that I. I want to say that that is a hypothetical conclusion reached about one phase of or one type of SDI deployment.

Frankly, that might from what the General has described here this morning, pertain to the SDI cluster type of thing where they are enclosed, but from what the General described about the Brilliant Pebbles proposition has nothing whatsoever to do with the Brilliant Pebbles proposition because it is not enclosed in a cocoon.

Mr. AUCOIN. My point, is why not debate the vulnerability?

Mr. LIVINGSTON. You are talking about some very strategic implications here. You are questioning the purpose of SDI and that is the purpose of us going through this research.

Is this deterrence——

Mr. AUCOIN. I would tell the gentleman I am raising questions that I think have to be answered.

If you want to deploy a system this costly without having a full understanding among our colleagues to the extent it could be possibly within security bounds, then I think that is a one-sided debate and probably like to lead to a poor answer.

Mr. LIVINGSTON. We are not talking about deployment yet, but secondly, I would say that the timing of the debate is important. The timing of the debate, if it is going to be public, should come when we have all the facts.

Mr. AUCOIN. I can't understand why whole chapters of a report which we asked to be conducted have been suppressed under the rubric of secrecy.

I would not argue that there are portions of this that should be secret, but to expunge an entire chapter on survivability, how can you ascertain whether SDI is workable or not, in concept even, if you can't get into some of the real vulnerability problems?

I have a couple of questions about space mines.

Mr. DICKS. Did the General finish answering the question?

Mr. AUCOIN. I understood him to say it happened not on his watch.

General MONAHAN. It is classified. Good and sufficient reasons were put together as far as I can tell right now that came from CIA and Air Force.

Mr. AUCOIN. Could this committee have those reasons?

General MONAHAN. I don't see why not.

Mr. AUCOIN. I would like those for the record so we can review what those reasons were. We have entire sections classified. You will provide that?

General MONAHAN. If the committee so desires.

Mr. AUCOIN. Mr. Chairman, I think we ought to have that information.

Mr. MURTHA. Certainly we want a full debate and we are not trying to divulge any information that should be classified. If there is some information that does not need to be classified and you review it, we would like to see that unclassified. But we would like to, I think, maybe review what is and what isn't classified.

General MONAHAN. I would be happy to provide that.

[The information follows:]

Public Law 99-190 (FY 1986 Continuing Resolution) directed OTA produce a comprehensive classified study together with an unclassified version on the technological feasibility and survivability of SDI despite a preemptive attack. This congressional mandate authorized broad in-depth access to the details and plans of the SDI program with acknowledgement by OTA that the sensitivity of the information would be protected according to existing Security classification directives.

Although discussions of vulnerabilities of existing space-based systems is extremely sensitive and controlled at the Top Secret level, discussions in the OTA report about vulnerabilities associated with potential system configurations are not as directly related to extremely grave damage to U.S. security interests by their compromise and therefore may be controlled at a Secret level of classification. From another aspect, a knowledgable reader/evaluator of the OTA report would realize easily and quite correctly that the report was a government sanctioned description of everything going on in the SDI program together with an informed evaluation of its potential either favoring the success or fragility of the system. Compromise of the assessment through its release in an unclassified form would be of tremendous intelligence value since it would allow the Soviets to prioritize their Countermeasures program in the area evaluated as most damaging to the SDI and avoid using resources on countermeasures which have been exhaustively analyzed and determined to be ineffective. The very value of the bulk of the information in the last three chapters stems from being a government sanctioned source that provides one-to-one correspondence between what was learned in the Program Offices and what was written in the OTA report. With passage of time since the last review and growing specificity of the SDI architecture, the sensitivity of discussions relative to countermeasures and system survivability demand further caution. Therefore, I cannot add any further material for release in unclassified form from the last three chapters beyond what was released last year.

SPACE MINES

Mr. AuCoin. Here is an example of working the problems that can be worked and ignore the ones that can't. You have people at Los Alamos and elsewhere devising ways to identify and destroy space mines, maybe 200 kilometers away from your SDI satellites, but the more serious threat is a space mine that is orbiting not several hundred kilometers away but a few feet away from our SDI satellites and doing so on a routine peacetime day-to-day basis. This is a scenario I discussed in the past with General Abrahamson and he admits that could be routine peacetime day-to-day operations.

Now in that kind of case with space mines located that close, we can't just shoot the space mine whenever it approaches any more than we could shoot at a Soviet destroyer shadowing our battle groups. It is by definition an act of war. When I ask your people about this, their response is we will get an agreement with the Soviets prohibiting any such close encounters. When I ask them why in the world the Soviets would agree to a regime that would support SDI, they don't have any answers for that. It would be counterproductive from the Soviet side. Do you have any evidence whatsoever the Soviets are interested in an agreement that would prevent space mines from being stationed a few feet away from those SDI satellites of ours?

General Monahan. Well, first of all, I am not a student as of this time of space mines, so I am not personally up to speed on what the amount——

Mr. AuCoin. You are a military man. From the other side, if you were in the shoes of your counterpart over there, would you find

any incentive to restrain yourself by treaty from close proximity, close encounters?

General MONAHAN. I might very well if I felt it was to my advantage.

Mr. AUCOIN. Would you think as a military man for it to be to your advantage? Would it be more to your advantage to have them located close to the potential target?

General MONAHAN. It may or may not. Each have their own ability to move and they can move ———. So in case of a crisis or any urgent situation, we can move them around. We can, for example, attempt to ———. That is just a good tactical advantage that Brilliant Pebbles brings along with it. ———.

That is the first point. The second point is Brilliant Pebbles, and we are talking ——— interceptors up there. I think that makes it very difficult to have ———. I don't know how they could do that.

Mr. MURTHA. The time of the gentleman has expired.

Mr. Miller?

BRILLIANT PEBBLES

Mr. MILLER. Thank you, Mr. Chairman.

General, I know that you had some questions about the Brilliant Pebbles and the concept, and you have discussed that to some degree, but General Abrahamson in a February 9, 1989 memo to Secretary Taft, said that Brilliant Pebbles concept could be deployed in ———. He went on to say that the total Phase I costs estimate would come to about $25 billion once you accounted for the necessary ground complex and an orbiting surveillance satellite system. Are these numbers reliable?

General MONAHAN. Mr. Miller, I have read General Abrahamson's report, and I don't know—it is difficult to say at this time the degree of reliability I would want to put with those. I think we have to know more about Brilliant Pebbles. We have to know whether these small sensors, indeed, will work. Will they do the job? Can we, indeed, mass produce them? We never mass produced anything like this before, mass produce it so we get the dollars-per-pound down to where we would like to do it. Can we, indeed, develop the necessary communication scheme, laser communications so they can talk back and forth. I don't see anyone of those as something insurmountable at all.

All I am saying, I don't think we have looked at it quite hard enough yet to be able to say that the dollar estimates General Abrahamson provided are, indeed, reliable. It is very clear that the Brilliant Pebbles has the very high potential of greatly reducing the cost of the space-based ballistic missile defense system.

There is no doubt about that. Whether or not we can get down to those numbers General Abrahamson said, I am just not prepared to say at this time.

Mr. MILLER. Would you have an idea, General, whether that figure takes into account the cost of monitoring all of these items into orbit?

General MONAHAN. I am assuming they must have included that because I think he gave kind of a wrap-around figure, as I recall, in reading the report.

Mr. MILLER. We have received testimony this year, I believe from CINC Space Command that we are experiencing a critical shortfall in our ability to put satellites in space, and by comparison the Soviets have a very robust satellite launch capability. Given what we might call our weak posture in this area, is the ——— deployment time frame for a Brilliant Pebbles mentioned by General Abrahamson in his memo realistic or achievable?

General MONAHAN. Well, I think what you just mentioned there about not having the launch capability might be one of the reasons why we may not be able to do it in the ——— period of time.

Clearly, to launch a very, very large number of Brilliant Pebbles, up in the ——— we are going to need an awful lot of launch vehicles, and I don't believe any of us have really sat down and figured out just what that requirement would be.

I quite agree, I think that is one of the reasons why it is premature to say it can be done within any period of time and can be done for a certain dollar amount.

Mr. MILLER. Are we talking about a program that may take many more years than what is being discussed at the present time then?

General MONAHAN. Yes.

SPACE POWER

Mr. MILLER. One of the things General Abrahamson had spoken about was the energy required to fire the bullets, so to speak. According to one of the news articles, the pellets, weigh some ——— or so. Is that correct?

General MONAHAN. Yes.

Mr. MILLER. But to fire those projectiles at the speed that is necessary, the General was talking about mass of energy almost equivalent to what we know now as an electric utility generating plant, an extreme amount of energy. Have we found the technology that would give that burst of energy to be able to fire something weighing ——— or so, at a speed necessary to be able to move in on a high-speed ICBM and destroy it?

General MONAHAN. Okay, Mr. Miller, we have technology programs that address the energy, electrical energy in space issue. When we think about large amounts of electrical energy necessary in the program that is normally associated with Space-Based Laser and Neutral Particle Beam type weapons. ———. We have one, for example, that we have underway, what we call the SUPER, I forget what it stands for, but it is a program to improve our solar energy systems that we use today to make them more efficient so we can get more power. ———. That is just one example of power systems.

Mr. MILLER. But, General, would that not require some storage system of electricity so that we could have that one burst when it is needed?

General MONAHAN. ———.

Mr. MILLER. I believe, General Abrahamson at the time was talking about firing from a rail using a magnetic field to fire. That was the early stages.

General MONAHAN. That is the electromagnetic rail gun he was talking about there and you are right, that is one that requires a very good burst of electrical energy and very, very, very rapidly. That program is one that we have under technical assessment. It has to capture the level of our attention as some of the others.

With that kind of system, tracking is very, very—it has to be done very, very precisely and it can be difficult. We have efforts underway looking at it ———.

Mr. MILLER. Just to reiterate, the systems that are being considered at the present time, none of them would use nuclear power; is that correct?

General MONAHAN. That is correct. Everything in Phase I, there is nothing nuclear about Phase I at all. ———. We do, however, fund efforts that look at, technical efforts, say, in case we do need it, you know, would we be at a sufficient stage of development such that one of the space ———.

Mr. MILLER. Are you saying the Soviets have nuclear reactors in space?

General MONAHAN. Yes, sir.

Mr. MILLER. And we have none?

General MONAHAN. We have none, that is correct.

Mr. MILLER. Thank you very much, General.

I have used my time.

Mr. Livingston?

Mr. LIVINGSTON. Those nuclear reactors could be used in anti-satellite activities, could they not?

General MONAHAN. Perhaps. I do know they are used right now to power certain of their satellites.

Mr. LIVINGSTON. The Soviets could have killer satellites just as easily?

General MONAHAN. Right.

Mr. LIVINGSTON. I am very interested in this Brilliant Pebbles concept because I think it answers some of the questions Mr. AuCoin has expressed. My biggest concern is one Mr. Miller touched on and that is given the capability that we currently have to put items in space right now, I don't see how we are going to launch ——— of these things up there until something drastically changes. I have heard of new developments, and I guess you are working on them, that would send them up cheaply and position them quickly and effectively without much cost, but my guess is we are quite aways away from that right now?

I really don't have any questions other than to say that my understanding, and I would like you to correct me if I am wrong, is that basically a defensive system is a deterrent to nuclear warfare.

General MONAHAN. Sir, it is a defense and I—which I would say contributes to deterrence.

DETERRENCE VALUE OF SDI

Mr. LIVINGSTON. That is fair. But unlike our offensive weaponry such as the MX, SLBM's, and others, which are strictly offensive and really fall under the mutually assured destruction concept, you blow us up, we will blow you up, this is an effort to make the Sovi-

ets uncertain whether or not their missiles and weapons will actually ever get to us.

General MONAHAN. Yes, sir.

Mr. LIVINGSTON. And for that reason, I think that it is very difficult for independent organizations to look at these things and make predeterminations as to whether or not they are going to work, and it is all rather meaningless because I think the system is less effective towards the Soviets than it is perhaps towards the megalomaniacs, the Quadhafi's, Third World countries that are acquiring a proliferation of missiles and capability, nuclear, chemical or otherwise.

It seems to me that we are probably and hopefully getting past the possibility of having conflagration with the Soviets, but we are never going to go beyond the threat of having that Third World dictator or someone else send a missile up. What we have today with SLBMs, MX's and others has not deterrent value whatsoever to a Quadhafi or somebody like that and yet this system may.

General MONAHAN. Yes, indeed.

Mr. LIVINGSTON. This system would work? Is that a fair statement?

General MONAHAN. Yes, sir, this system would work. First of all, space based elements can defend—well, they will attack any missiles no matter where they are fired in the world and wherever they are going.

It doesn't matter if they are heading for the United States, for Europe, the Soviet Union or anyplace else.

Mr. LIVINGSTON. Or who fires them?

General MONAHAN. Or who fires them. With the space-based elements with the Brilliant Pebbles they can be attacked, hopefully destroyed.

Mr. AUCOIN. Would you yield?

On that point it would seem to me a lunatic dictator like the Ayatollah could mainly, or a Quadhafi, probably couldn't make a missile that would fly straight and represent a real threat. More likely they would use a suitcase and put a nuclear device in the suitcase and bring it on to those shores and use it in that fashion. This is no answer to that.

Mr. LIVINGSTON. I think that Gentleman is absolutely correct today, but we are seeing in the papers the Chinese are making missiles, the Argentinans and many other countries are capable of making missiles and selling them. It is just a matter of time before the nut gets the warhead and the missile put together and tries to threaten us, and we are not prepared for that. I don't think that we can ever prepare for the suitcase or wheelbarrow. But we can prepare ourselves against this eventuality.

Mr. AUCOIN. If we can prepare the system, the other side would know that. Why wouldn't they use the suitcase which is more inexpensive in the first place, and they know there is no defense against that?

Mr. LIVINGSTON. I think you are leaving yourself wide open. I am not going to put myself in the mind of the Ayatollah. I would rather be protected than uprotected.

Mr. AUCOIN. You haven't offered a protection.

Mr. LIVINGSTON. I will leave that the Customs Bureau and everybody else who protects our shores to try to keep the bombs out.

Mr. AUCOIN. I never thought I would hear when you would trust the Customs Bureau for the security of the United States.

Mr. LIVINGSTON. We have the protect ourselves against all eventualities and one of the eventualities within the next five years possibly is that a Quadhafi or Ayatollah will have a missile or a warhead and we are not going to be ready for it.

Thank you.

Mr. AUCOIN. Let the record show we are not ready for the suitcase and we will not be ready in the future for the suitcase either.

Mr. MURTHA. The Gentleman from Washington.

BRILLIANT PEBBLES

Mr. DICKS. General, the proposal calls for ——— Brilliant Pebbles—since the United States tracks 7,000 space objects such a signal would ———. How would this ——— be accomplished and is that included in your cost estimate?

General MONAHAN. First of all, I don't have a good reliable cost estimate for Brilliant Pebbles.

Secondly, it is not clear to me that we would have to ——— and the reason I say that is because Brilliant Pebbles themselves report back where they are all the time ———.

Mr. DICKS. How would we launch ——— space objects each requiring a different orbit?

General MONAHAN. Well, obviously with quite a few launch vehicles.

Mr. DICKS. How many could you launch per vehicle?

General MONAHAN. we have not calculated that, Mr. Dicks. But the relatively light weight, so, you know, about ——— apiece, and when you integrate that on to a carrier and booster, I don't know, nobody has worked that out.

Mr. DICKS. Could the existing Titan ELV satisfy the requirement without development of a new orbital maneuvering vehicle?

General MONAHAN. I think that the Titan ———.

Mr. DICKS. The committee is convinced that the current concept calls for use of IR focal plan arrays which are available today ———?

General MONAHAN. This is true. Depending upon what weapon—are you talking about Brilliant Pebbles?

Mr. DICKS. Yes.

General MONAHAN. In the case of Brilliant Pebbles, as I said earlier, Mr. Dicks ———.

Mr. DICKS. Isn't that going to dramatically reduce the viability of this?

General MONAHAN. ———. Now, in the Delta Star experiment that we hopefully will launch this week on Friday. ——— we ought to be able to get a good evaluation of the capability of that ——— and we will have a much better handle on that. That is one thing. The other part is this. We can improve the sensors. The technology is improving all the time. ———.

Mr. DICKS. Would Brilliant Pebbles be able to handle ——— requirements using existing technology, and if not, what would?

General MONAHAN. I think part of that answer is wrapped up in what I just said.

Mr. DICKS. Right. What impact would newer technology have on the cost of this system?

General MONAHAN. I believe newer technology could help reduce the cost. Can reduce the cost.

[CLERK'S NOTE.—Classified discussion removed.]

Mr. DICKS. How much funding has SDI obligated to date on Brilliant Pebbles and when will a decision be made whether or not to include it in the Phase I architecture?

General MONAHAN. Well, as of this time, I know this year we are planning to spend $46 million, I forget what we may have spent in years gone by. And the next part of your question, Mr. Dicks?

Mr. DICKS. When will you make a decision on whether to include it in the Phase I architecture?

General MONAHAN. We are looking at that right now, at the present time. As we go through the strategy review, we have at least a couple of options that look at Brilliant Pebbles in there. I think the basic fundamental decision that has to come is, should we pursue Brilliant Pebbles? By the way, I find a lot of support for the Brilliant Pebbles concept. So conceivably, the time we complete the strategic review and when we submit the revised budget, we may at that time have some decisions. May.

Mr. DICKS. Is it possible that ——— for SDI missions if Brilliant Pebbles are utilized?

General MONAHAN. That is an open question as of the moment. First of all. ——— don't think there is much concern or much question about that. Secondly, it could complete the Brilliant Pebbles. It is not absolutely necessary a ———. Let me tell you one way it could help out is in directing other Brilliant Pebbles to come to the scene of the action. ———. I think there is a lot of advantage to having ——— as well as Brilliant Pebbles.

BSTS PROGRAM

Mr. DICKS. The fiscal year 1990 budget includes $262 million to begin full-scale development of the BSTS system. If approved, this would be the first SDI program to enter full-scale development.

General, if a BSTS satellite were deployed which meets the requirements set forth in the currently approved Phase I architecture, would it be in conflict with the narrow interpretation of the ABM agreement?

General MONAHAN. I don't know about narrow or broad, but as of the present time, the treaty compliance review people have not completed their review of BSTS so we don't have a good definitive answer as to whether or not it is treaty compliant.

Mr. DICKS. If it is a battle management radar in space per se, isn't it a violation of the ARM agreement if deployed?

General MONAHAN. I think that is one of the considerations of the group.

Mr. DICKS. When are they going to have an answer?

General MONAHAN. As it stands right now, because of the design work that is still underway on BSTS and because we are in the demonstration validation phase, until we complete that phase they

are reluctant to complete all of their reviews necessary for compliance, and that would—the long answer is it would be next summer.

Mr. DICKS. Somebody, it may have been General Randolph, has said publicly they feel BSTS as presently constituted, is a per se violation of an ABM agreement if deployed. Now, Dr. Smith, a former SDI deputy, also said in testimony here it would conflict with the ABM treaty. I believe General Yates was asked a few days ago whether they were going to try to develop a BSTS that would be treaty compliant. That's because there were some people arguing that it would be better to use a DSP upgrade that would not violate the treaty rather than going ahead on BSTS which would be a clearcut violation of the ABM agreement, especially since the architecture now for this phase I has changed. What is your view of that? Have you looked at the DSP upgrade as a possible way to do that in lieu of BSTS and how do you feel about it?

General MONAHAN. First of all, I have looked at it. How do I feel about it? I think it is too early to rule it out, number one. So that means that we need to get with it and figure out whether or not it would be acceptable. And the way we do that is through competitive source selection we are going to run for BSTS.

Mr. DICKS. So you are going to look at the upgrade?

General MONAHAN. What we are going to look at is this. When we put out the request for proposal for the BSTS, which will be about a year from now, we will have specified the requirements for what that satellite has to do. Those requirements will have certain threat warning and attack assessment requirements as well as the battle management C3 requirements required by SDI.

Then, once that is out, any satellite of any description that can meet that may be proposed by any contractor. So an evolved DSP seems to me is the candidate. So in the competition you look at the proposals from all the contractors that wish to submit them, and if an evolved DSP is submitted we will take a look at it.

Mr. DICKS. Current plans call for a review group to make a decision on BSTS in the summer of 1990. Why should Congress approve funds for full-scale development for this system when we don't know if it is compliant with the ABM treaty?

General MONAHAN. Well, first of all, we may or may not proceed with the full up satellite for the first satellites. It may not be necessary to do so. ———. So what we would plan to do, and this has not been totally solidified right now, would be to at the time of source selection and if we do get thumbs down on BSTS through the treaty compliance review——

Mr. DICKS. I think we are going to need to know before we mark-up this bill. My judgment is you are going to need to be able to tell us whether you have a totally compliant system or not.

I am not going to vote money, and will lead a fight against putting money in for full-scale development if we don't have a thumbs up on treaty compliance. I would hope we would accelerate that and get it here before we mark-up this bill.

General MONAHAN. Thank you, sir.

ANTI-TACTICAL BALLISTIC MISSILE (ATBM) PROGRAMS

Mr. MCDADE. As part of its overall mission SDI funds are a program to defeat tactical ballistic missiles. Included in this effort is the joint United States-Israeli development of the Arrow missile. Concerning the overall ATBM program, what is SDI's overall 1990 budget request for ATBM programs and how does that compare to last year?

General MONAHAN. Our overall request for fiscal year 1990 I believe you said?

Mr. MCDADE. Fiscal year 1990 first. How does it compare with 1989?

General MONAHAN. In fiscal year 1990 we are requesting $58 million, for the extended air defense test bed, $24 million and the Arrow experiment there is $52,000,000. I don't believe I have with me the information for fiscal year 1989, but that is the——

Mr. MCDADE. Get that for us and put the comparisons in the record. Tell us what has been added or deleted from last year's estimate for fiscal year 1990 of $136 million.

General MONAHAN. I would have to go back and compare that with——

Mr. MCDADE. Get that for us.

[The information follows:]

The fiscal year 1990 request includes some $195 million in support of theater missile defense research programs, while the fiscal year 1989 program was approximately $110 million. The principal difference between the fiscal year 1990 budget estimate and the current request is in the definition and scope of the projects, not the types of programs being considered. For example, the fiscal year 1990 estimate was presented prior to the conclusion of the United States and Israeli negotiations concerning the cooperative Arrow missile experiment. (The fiscal year 1990 estimate included only $27 million for Arrow while the actual program requires $50.9 million to meet agreed goals.) Further, the ERINT (Extended Range Intercept Technology) program was restructured to take advantage of successful earlier technology experiments to be able to test a pre-prototype missile in fiscal year 1991. (The fiscal year 1990 estimate was $40 million while the requested program is $58.9 million to meet this goal.) Similar changes were made to other elements of the SDIO TMD program. Finally, the fiscal year 1990 request for SDIO Theater Missile Defense programs reflects a change in program philosophy from analyses to technology experiments.

Mr. MCDADE. The Arrow flight test will use other Arrow missiles as the targets. How will the Arrow missiles simulate the flight profile signature of tactical ballistic missiles?

General MONAHAN. First of all, the Arrow is a ballistic missile itself and it is about the same size and weight.

Mr. MCDADE. You don't have any problem duplicating it?

General MONAHAN. We have no problem with doing that.

OVERALL FUNDING LEVELS

Mr. MURTHA. I will ask just a couple of questions.

I just wanted to ask a general question about the overall money level. Now, obviously every year we have cut back from the amount the President has requested. Early on, General Abrahamson said we needed the big money up front because we are going to be shifting priorities, we have to figure out which one of these programs has the most potential. He said that we will probably use

this money, or not waste it, but some of this money won't be spent efficiently at first, but we need a lot up front.

We didn't give them a lot up front but we gave them money and he went ahead. Can we assume by this time you have shifted down to where you have a more stable program than you did five or six years ago?

General MONAHAN. Yes, sir.

Mr. MURTHA. So what I am asking is can you give us any idea at this point of what you absolutely need?

Mr. Dicks mentioned $4 billion. I don't know what the figure is, but if you can't give us the figure today, then make sure that your staff works closely with our staff so that the programs that are essential in SDI are funded adequately and we are spending the money efficiently.

One of the big problems, as you know, we have in buying any weapon system is that F-16s, for instance. If you buy them at a lower rate you don't get near the efficiency. I assume in research it is just a matter of tremendous delay if you don't have the money and an instability in the program means you lose scientists and you lose continuity, and it takes—well, it is much more expensive in the long run.

Can you give us any figure at this point about what could be essential to your basic program?

General MONAHAN. I hesitate to do that right now, Mr. Chairman. Because we have the budget review process underway.

Mr. MURTHA. I understand that, but one of the things I used to argue about with Secretary Weinberger all the time was he never was willing to give us the priorities. So I hope that you will not feel constrained to give us priorities, but give us what you really need to keep this program in a stable mode in the future. Mr. McDade?

EARMARKING OF SDI FUNDING

Mr. MCDADE. In that connection, we had a heck of a fight last year about earmarking. Tell us about the position of the office with respect to earmarking.

General MONAHAN. First of all, I think that, especially at this stage of the program, the program manager needs the flexibility. There is no question about it. We are still making tradeoffs between what elements of the program would perform what functions, certain technologies are going to work, others are not going to work. We just need to be able to trade the research and development dollars back and forth as we see fit.

Obviously, as I said earlier, I am trying to make it as stable as I can on an annual basis with various parts of the program. I am not going to be able to do that 100 percent across the board. Any manager likes to have the flexibility and stability, and I think that especially at this stage of the program.

As you finally get down to a production program it is a different situation. You can say I want you to spend this much money, buy this version of an M-16 and another on another version. Right now when we are so early on with technology we need flexibility.

Mr. McDADE. Well, last year—this led to the veto of the Authorization bill. I was present in the White House when the decision was made and it was the lower level plus earmarking that took away that flexibility that led to the veto. I wanted to ask that question.

Let's talk about these upcoming experiments. There is a list of experiments that over the next two years SDI is planning, and they include several large space and airborne tests and I think your statement goes through a summary of what those tests are.

Would you briefly explain the objectives of these tests, these 18 tests, and tell us why they are all so important and essential?

General MONAHAN. I would like to talk about six of the largest ones first of all, if I may. One of them is Delta Star. That is a satellite we are going to launch this Saturday—this Friday perhaps, depending upon the weather—and that particular experiment is a satellite that has a number of sensors on board, multispectral sensors going across the little sprectrum of various wave lengths and primarily they are to look at rocket plumes. ———.

Mr. McDADE. We are talking about there is identification, is that correct? Identification of it?

General MONAHAN. Yes sir. In other words we want to—it is very important for us to know what a rocket plume looks like to an infrared sensor and the plumes can be different from one missile to another, from different kinds, one different kind of fuel to another. So that is the main purpose of the Delta Star ———.

The next one that is a large experiment is the BEAR, a Beam Experiment Aboard Rocket. This will take place in ——— at White Sands. It is a suborbital test and it is an experiment where for the first time, somebody will operate a neutral particle beam in space. So we hope to learn an awful lot about neutral particle beams from that. That is a test response ordered by Los Alamos National Labs.

In ——— we will have a space test we call Laser Atmospheric Compensation, Relay Mirror Experiment. It is an atmospheric compensation processing laser. In ——— a Starlab satellite which has as its purpose investigations of tracking and pointing and sensor and communications technologies. In ——— we are going to do what——

Mr. McDADE. What are you going to track that against? What will that track?

General MONAHAN. We will track it against, I am sure, a tremendous number of targets. We will set up the whole service of experiments just as we do at Delta star.

For example, with Delta Star, we are at the point in our planning we know almost day-by-day what it is we are going to look at. We have the ——— so we can get an idea what that looks like. Star Lab will look at a number of them.

The Space Power Experiment Board Rocket, we call SPEAR III and that is a test of high power electrical applications in space.

Airborne Optical Adjunct, which is a device mounted on a Boeing 757 airplane, which is an airborne test of long wave infrared sensors.

Those are just the top five or six of the 18 or so that we plan for the next two years. All of those efforts for the next two years have been reviewed by the treaty compliance review people, and have all been deemed to be treaty compliant.

Mr. McDADE. As the manager of the program you have no doubt of their importance to the program, they are all necessary?

General MONAHAN. I have looked at the ones that I just mentioned and I have not completed my review yet of them all.

Mr. McDADE. But on those that we have just discussed?

General MONAHAN. Yes sir. I have looked at those.

Mr. McDADE. When do you complete your review of all of them?

General MONAHAN. I don't have my schedule set for that yet. I need to get a schedule set.

Mr. McDADE. At which point you will be in communication with us?

General MONAHAN. Yes sir.

Mr. McDADE. What is the total cost of all of those?

General MONAHAN. Of the six I just mentioned, I believe it is about $225 million. I don't have——

Mr. McDADE. Will you put in the total cost for the six and do it experiment by experiment and furnish that for the record?

General MONAHAN. Yes sir.

[The information follows:]

	Millions
AOA	$658
BEAR	60
DELTA STAR	180
LACE/RME	258
SPEAR II	18
STARLAB	680

Mr. McDADE. Than you, sir.

Thank you very much.

Mr. MURTHA. Mr. AuCoin.

Mr. AUCOIN. I will yield to my friend.

BSTS PROGRAM

Mr. DICKS. I wanted to finish up on BSTS.

Going back to the treaty compliance review question. If this group finds one design to be compliant and another non-compliant, it would seriously favor one contractor over the other, since the contractor award is scheduled only a couple of months after the review is complete.

If full scale development were delayed to more appropriately account for the review's findings, wouldn't that be more fair to industry and provide for a more effective competition?

General MONAHAN. First of all, I didn't get——

Mr. DICKS. I think the question is this. You are going to go to full scale development on this, without knowing whether it is treaty compliant or not. So how did contractors come in and give you their final plan?

One of them might be treaty compliant, one might not be treaty compliant. It would then give an enormous advantage to the one that was. It seems to me there has to be some guidance here, either

tell them do something that is treaty compliant or do something that isn't treaty compliant.

General MONAHAN. First of all, Mr. Dicks, I have a hard—I don't see how we could have one contractor be treaty compliant and the other not if they are both responding to the same specifications that we gave, because they——

Mr. DICKS. Either you are pregnant or you are not. Either you violate or not.

General MONAHAN. Right.

Mr. DICKS. I go back to my fundamental point. It seems to me we have got to know whether what we are doing is treaty compliant or not before we go to full scale development.

General MONAHAN. Yes, we clearly will. We will do so.

By the way, Mr. Dicks, the amount of funds required for full scale development in fiscal 1990 that is in the President's budget is incorrect. I believe we submitted $262 million for full scale development funds. That number should really be $30 million. I don't know exactly how the error was made.

And by the way, we need the rest of it in 6.3. So we need to swap around the 6.3, and 6.4, funds. My staff will be working with your staff on that effort.

By the way, the $30 million is commensurate with the schedule I mentioned where we schedule-wise were planning on awarding the contract for full scale development on the first of September of 1990. So it is just one month before the end of the fiscal year. Obviously there can't be a lot of full scale development money required for fiscal year 1990.

Mr. DICKS. Do you believe BSTS will become primarily an early warning satellite like today's DSP space and save margins to add to strategic defense capability at a later date?

General MONAHAN. That is clearly an option, Mr. Dicks, and it could go that way.

Mr. DICKS. When will you make that decision?

General MONAHAN. Well, first of all, as I described, we will put out the request for proposal for BSTS, according to current plans, in about one year from now. Then that research will have the specifications that tells here is what we need in the way of battle management C3, threat warning and attack assessment capabilities. That is when it would occur.

Now, having said that, I think I need to also, regarding BSTS, make a broader statement and that is with the strategic review that is underway. All elements of SDI are being looked at in that review, including BSTS. So, as we envision that program at this moment, the way it is in the President's budget today, that is subject to change.

Mr. DICKS. Okay. Now we are told that the report to the Congress on space based infrared systems in June 1988 concluded a scaled down BSTS was preferred to an evolved DSP, since only BSTS could meet all forecast requirements. However, the committee is advised BSTS does not yet have an approved statement of requirements document, ADA validated threat document, which determines system's survivability requirements or a system's requirement review, which views the limits of technology performance.

How can we say an evolved DSP cannot meet requirements when those requirements have not yet been developed and approved?

General MONAHAN. As I described earlier, I think it is still an open question, whether you call it an evolved DSP or not. We will sort that out during source selection.

Mr. DICKS. I was out at the Space Command—they said the one thing they were worried about is somehow we were going to chop off DSP before we get to BSTS. They are worrying about having enough assets to do the job they are required to do in early warning. Can you assure us that is not going to happen?

General MONAHAN. We are working with them on a transition plan at the present time.

Mr. DICKS. You think that is an issue?

General MONAHAN. I don't think it is an issue at this moment.

Mr. DICKS. Will it be in the future?

General MONAHAN. We need to sort it out first of all, within the Department of Defense. Some people want more overlap than others. So we need to work on that.

Mr. DICKS. What is your assessment of the technical risk of BSTS development and what are the highest risk elements?

General MONAHAN. I think with BSTS that it is a fairly low development risk, but we need to complete our ground experiments here over the next year or so and that will give us a better handle for it. ———. I guess you would say. I don't know that they are all that terribly risky.

Mr. DICKS. What is the production cost estimate and the life cycle costs for BSTS?

General MONAHAN. I do know this. BSTS in the Phase I program, we have $8 billion, and that $8 billion in the Phase I program is all the development work for BSTS and procures the ———. So that is what it is for, that portion of it. I may have more data here on life cycle costs——

Mr. DICKS. You can put that in for the record.

General MONAHAN. I would have to do that.

[The information follows:]

The current estimate for acquisition of the Boost, Surviellance and Tracking System (BSTS) is $8B (all costs are expressed in constant fiscal year 1988 dollars). Of that, $0.6B is for demonstration validation, $4.8B is for full scale development and $2.6 for production. The total recurring cost of satellites, contained within the full scale development (for operational test and evaluation) and the production phases is $3B–88.

The annualized Operation and Support (O&S) costs for BSTS are $0.5B with $0.35B for satellite replenishment and $0.15B for general O&S.

Mr. DICKS. There is a number of other questions that follow I would like to ask for the record.

[CLERK'S NOTE.—Questions submitted for the record and the answers thereto follow:]

Question. Current schedules call for FSD contract award no earlier than August 1990, which is only two months before the fiscal year ends. Experience shows that contract award dates almost always slip by a few months. Given this, why don't we defer FSD funding until fiscal year 1991?

Answer. Experience shows that money release is usually not forthcoming early in the new fiscal year so the resultant slip would

be much greater. It is our intention to award the FSD contract in August 1990, given FSD approval. A slip into 1991 could increase program costs by $100—$150 million. Risk in schedule will be increased also and another DSP may have to be procured to cover the slippage.

Question. Will any of the $262 million requested for FSD be required prior to approval to enter full-scale development?

Answer. The number $262 million in the request for FSD funding is in error. This allocation of the approximate total of $330 million into 6.3 and 6.4 of $68 million and $262 million was a mistake. The correct allocation of the $330 million should be $300 million and $30 million for 6.3 and 6.4 respectively.

The $30 million needed for FSD in fiscal year 1990 is intended to start the FSD follow-on contract. It is intended to cover the costs of beginning the follow-on effort lending to FDR, CDR and finally the procurement and flight of the FSD vehicles. Approximately $10 million of these $30 million are expected to be used for the procurement of the long lead parts, such as mirror blanks and electronic piece parts, for these first flight articles.

None of this FSD request is expected to be required before approval to enter FSD is obtained. These monies, especially the long lead parts dollars, would be required ahead of the FSD decision only if (1) the FSD decision was delayed, (2) the BSTS schedule was to be maintained, and (3) specific authority to go ahead was granted early.

Question. The current DSP satellite costs $350 million. What is the estimated procurement cost of the BSTS satellite?

Answer. The estimated cost of one BSTS satellite is approximately ———. Although the BSTS is a more capable system, the BSTS costs relatively less than the DSP satellite for three reasons. First, BSTS satellites will be configured identically, enabling them to be mass produced. Second, recent developments in producibility, as well as the producibility investment that is included in the estimate, will reduce production costs. Finally, the expansion of the technology base will contribute to more economical production.

Question. DSP weighs approximately 5,000 pounds. What is the estimated weight of BSTS?

Answer. Approximately ——— pounds.

Question. DSP has approximately 6,700 focal plane array detectors. How many detectors is BSTS expected to have?

Answer. Between approximately 80 thousand and 8 million depending on the contractor design selected.

Question. DSP requires 1275 watts of power. What is the estimated BSTS power requirements?

Answer. 4–5 kilowatts average, 5–6 kilowatts peak.

[CLERK'S NOTE.—End of questions submitted for the record.]

Mr. MURTHA. Mr. AuCoin.

AIR DEFENSE

Mr. AUCOIN. General, earlier the discussion was focused on the concept that we have all been talking about since SDI was conceived and brought to the attention of the Army people and that is

defense versus deterrence. I want to explore that just a little bit with you today.

The world has had decades of experiments with defense against fast moving offensive penetrators of one kind or another. One of the fields that we have had experience in is anti-aircraft defense. We have had decades of antiaircraft defensive systems that were advertised to have high effectiveness but in practice major air defense systems have always delivered in the single digit percentage range, and in the low end of that range, as a matter of a fact.

On the other hand, the Japanese defense against our torpedo bombers in the Battle of Midway succeeded, and torpedo bombers aren't fast penetrators—can you name for the committee a single air defense in history that has been more than ten percent effective against a large attack?

General MONAHAN. First, I would have to go and do some research on that, Mr. AuCoin. I can't off the top of my head. On the other hand, I am not so sure how it translates into the sort of defensive system we are talking about.

Mr. AUCOIN. The point is you can't today. If you want to provide something for the record I would certainly welcome that.

[The informatin follows:]

In the case of at least five bombing attacks in the fall of 1943, the Germans destroyed more than 10 percent of the attacking bombers from the Army Air Force's Eighth Air Force.

August 12, 1943: Target—The Ruhr. Attacking force: total of 243 aircraft hitting 4 targets. Total losses: 25 bombers. *10.29 percent of the attacking force.* (Craven and Cate, *The Army Air Forces in World War II,* vol. II, p. 682.)

August 17, 1943: Target—Ball-bearing manufacturing facilities at Schweinfurt. Attacking force: 183 bombers. Losses: 36 bombers. *19.67 percent of the attacking force.* (Craven and Cate, *The Army Air Forces in World War II,* vol II.)

August 17, 1943: Target—Messerschmitt aircraft production complex at Regensburg. Attacking force: 127 aircraft. Losses: 24 bombers. *18.9 percent of the attacking force.* Over 10% of the aircraft (15) were lost before the attackers reached their target. Losses would have been higher had American bombers not surprised German defenders by returning to bases in the Mediterranean theater rather than the bases in England from which the attack was launched. (Craven and Cate, *The Army Air Forces in World War II,* vol. II pp 682–83, 685, appendix; Coffey, Decision over Schweinfurt, p. 20.)

October 10, 1943: Target—Munster. Attacking force: 236 B–17's. Losses: 30 B–17's. 13% of the attacking force. No indication as to how many bombers were downed before bombs were released over the target. (Craven and Cate, *The Army Air Forces in World War II,* vol. II, p. 850; John Sweetman, Schweinfurt: Disaster in the Skies, p. 126)

October 14, 1943: Target—Schweinfurt ball-bearings facilities. Attacking force: 229 bombers, Losses: 60 bombers. *26.2 percent of the attacking force.* Official AAF history records: "It was a sadly mauled force that finally reached the target." Twenty-one aircraft were lost before Schweinfurt was reached, and at least two other aircraft were so badly damaged that they had to jettison their bombs to keep up with the formation. Thus, 23 aircraft (10.3% of the attacking force) were lost before getting to the target. 40th Combat Wing that led the attack had lost 7 of 49 planes by the time it reached the target and lost 22 other aircraft after the attack. In addition to 60 aircraft actually shot down by the Germans, 17 other aircraft were damaged beyond repair and another 121 aircraft were damaged. (Coffey, Decision over Schweinfurt, p. 53; Craven and Cate, *The Army Air Forces in World War II, vol. II, pp. 703–04.* John Sweetman, Schweinfurt: Disaster in the Skies, p. 137, claims that 36 aircraft (15.7 percent of the attacking force) were downed before the target was reached.)

Mr. AUCOIN. My point is, you are now talking—I have done some research on that and by the way, there is no example in history—but you are talking about a much more difficult mission than that which I have just named and you are claiming you can be 10, 20, 50

times more effective against a more dynamic adversary than all historical experience indicates. What reason is there to believe that the SDI can do that much better than air defense?

General MONAHAN. First of all, it is an entirely different problem from air defense. In air defense, anti-aircraft artillery, the target airplane is within the lethal envelope anti-aircraft, probably just for a very, very short period of time, to begin with. It is a manned airplane, it can take evasive action, it can get out of there and do those kinds of things.

I am talking here about ballistic missiles and reentry vehicles which have a time of flight of about 30 minutes.

Mr. AUCOIN. It would be a more difficult task?

General MONAHAN. It would be much more difficult for them to evade defenses because they have to evade for 30 minutes. In the boost and post-boost phase, for example, the boosters have to fly a very, very precise track, otherwise they are not going to hit accurately. They are vulnerable. They are vulnerable there in that phase, which is something on the order of 12, 13, 14 minutes. I would love to be able to take a pot shot at something where I could track them for 12, 13, 14 minutes.

Mr. AUCOIN. When I think about how we penetrated German airspace in World War II, we were penetrating for hours and still the success rate in anti-aircraft on the other side never exceeded the ten percent.

General MONAHAN. We used a lot of defense suppression there. We have fighter airplanes that accompanied and went along with them. We also attacked anti-aircraft sites and all that kind of thing. I think it is just an entirely different kind of situation.

Mr. AUCOIN. You would say actually that we can be twice as accurate, not 10 or 20 percent?

General MONAHAN. I think we can be a lot more effective than that. Certainly we plan to be.

Mr. AUCOIN. We don't plan to be effective for a population defense any longer, do we?

General MONAHAN. We will be effective. We can defend any area we want to. With the space based system, as I said, that makes no discrimination where in the world you want to defend. We will defend any place in the world you like. With a ground based system you can design it and develop it so it can defend certain parts of this country or ignore others.

Mr. AUCOIN. Do the entire country?

General MONAHAN. Yes sir.

Mr. LIVINGSTON. Will the gentleman yield?

You asked a question about the historical air defense. In fact, we have shot down every Libyan plane that has ever shot at us.

Mr. AUCOIN. That is not heavy attack. I am talking about a massive, heavy attack.

Mr. LIVINGSTON. You are up in space.

Mr. AUCOIN. I am talking about an avalanche attack, and the historical record against such an attack. There is just nothing in history that indicates a success rate that even comes close.

Mr. LIVINGSTON. There has never been an avalanche of nuclear ballistic missiles?

Mr. AUCOIN. There certainly has been an avalanche of slow-moving bombers, our bombing raids on Germany, which were hours at length, was an example of wave after wave of offensive air attack.

Mr. LIVINGSTON. The Libyan airplanes were a lot faster than those bombers and we shot all the Libyan airplanes down.

Mr. AUCOIN. I am talking about the kind of attack that SDI is purported to save us from and that is a massive attack with how many warheads? Thousands of warheads. That is not a single Libyan jet. You need a more robust system than that and we needed a more robust system in World War II, the Germans did, they had one and their success rate was very slim, less than ten percent.

Now we are being told that with a much more difficult mission, we can somehow be 50 times more effective.

Mr. LIVINGSTON. I think technology has changed. It used to be we didn't have a telephone.

Mr. AUCOIN. I enjoy having conservations with my colleague, but this is a hearing and I am asking questions of the General.

Mr. LIVINGSTON. I am just interjecting a few thoughts.

DETERRENT VALUE OF SDI

Mr. AUCOIN. General, you indicated earlier when you were talking about SDI being not just defense, but also a deterrent, you were suggesting that it has deterrent value beyond just an iron shield kind of defense.

By that, did you mean SDI would add some uncertainty into the mind of the Soviet military planner and in that sense has deterrent value?

Is that what you were suggesting?

General MONAHAN. I am not an expert on deterrence. You can look at the strategic defense system as being a war-fighting system. It can destroy a certain number of re-entry vehicles, but then you can also look at it as a deterrent system.

Mr. AUCOIN. How does it work as a deterrent?

General MONAHAN. Because it adds the uncertainty in the minds of any adversary as to whether or not what he is going to attempt to do to you has a chance of succeeding.

He doesn't know, so, why attack and invite tremendous retaliation?

Mr. AUCOIN. I have heard that argument and I always wonder why we don't do that the cheap way rather than the expensive way, the SDI way.

If the purpose is to add uncertainty in the mind of Soviet military planner, it seems to me a treaty prohibiting flight testing of ballistic missiles would accomplish precisely the same thing.

You would add uncertainty in terms of the accuracy of those systems, that uncertainty in the mind of the Soviet military planner would be over time one in which he would probably not be apt to pull the trigger.

You get the Soviet uncertainty that you are talking about and it costs zero.

General MONAHAN. We are at the point here that it is very appropriate now to ascertain the value of SDS in arms control-type negotiations, the sorts of thing you just mentioned.

I think it can assist greatly there and provide us a lot of leverage.

Mr. AUCOIN. I am glad to hear you say that flight testing of ballistic missiles, if done by treaty, might be a sound strategic objective, but that brings me to your report, the Report of the Office of the Secretary of Defense justifications for the budget. I read on page 185 there something that would seem to contradict what you have indicated in terms of the arms control value of SDI.

I am reading on page 185, it talks about countermeasures to SDI. It describes technical countermeasures, and then it goes on to discuss something that I hadn't heard before, a new term to me, and that is "political countermeasures."

POLITICAL COUNTERMEASURES

It defines "political countermeasures" to SDI as being "such things as arms control or fostering opposition to the defense system by our allies." That would seem to say that arms control is looked upon as something that is an enemy of SDI. Does President Bush sign off on that rationale?

General MONAHAN. I don't know. I don't know if——

Mr. AUCOIN. These are your justifications for your budget?

General MONAHAN. This, of course——

Mr. AUCOIN. Is arms control a countermeasure?

General MONAHAN. I have never heard the term political countermeasure.

Mr. AUCOIN. It is here on page 185 of your justification.

General MONAHAN. I will leave that to those that have to consider things political.

Mr. AUCOIN. This is your justification for your budget, page 185.

General MONAHAN. Yes.

Mr. AUCOIN. So is arms control a political countermeasure to SDI? Is it a foe of SDI?

General MONAHAN. If I may, I would like to go back and re-read that and see exactly what it says and what the context is and what they are talking about when they say political countermeasure.

Mr. LIVINGSTON. Mr. Chairman, I know we are not in a court of law, but I would suggest, Mr. AuCoin, why don't you give the guy a week or two to look at it? Don't put him on the spot right now. That is a critical question.

Mr. AUCOIN. I didn't write his justification.

Mr. LIVINGSTON. You are asking him for an opinion on something he hasn't even read about or even heard a term on before. Give him a chance.

Mr. MURTHA. Let's see what the General has to say here.

Mr. AUCOIN. You are familiar with your justification, aren't you?

General MONAHAN. It says countermeasures may be technical or political.

Mr. AUCOIN. I was focusing on the political side. I found it fascinating.

Mr. DICKS. What is a political countermeasure?

Mr. MURTHA. Pose the question to the General and let him answer the question.

General MONAHAN. I am not sure I understand what the question is now.

Mr. AUCOIN. The point of departure was this: I indicated that the uncertainty in the mind of the Soviet military planner could be more cheaply or more effectively achieved by a flight test ban on ballistic missiles.

You indicated an advantage of SDI was its treaty-obtaining capability.

I read something in your justification, a definition of arms control as one of the kinds of political countermeasures that could sink SDI.

General MONAHAN. This is saying that through arms control somebody may decide not to have a strategic defense system, I guess that is what this is saying. I have never read it before.

By the way, I don't know that it is particularly effective in the sense that it is used because it wants to talk about the countermeasures we have in the SDI, which is a good, well-organized robust effort not even germane to what this piece of paper talks about.

Mr. AUCOIN. But it is in your justification. I have never seen arms control described by this President or the last one as a political countermeasure.

General MONAHAN. Nor have I.

Mr. AUCOIN. Would you put arms control as a higher objective than SDI?

General MONAHAN. You know, SDI, as I said earlier, hopefully contributes to deterrence and to the security of this country and whatever it can do in the way of assisting in arms control negotiations in providing leverage; I think, that is one of its assets.

Mr. AUCOIN. You don't see arms control as being a political countermeasure to SDI?

General MONAHAN. I think that that is a pretty far—I am searching for the right word here—I don't think the argument is very rigorous that says that it is a countermeasure to SDI. I think the use of the word "countermeasure" in that context is completely inappropriate.

With a countermeasure, I am thinking about something that can be done hardware-wise, in a tactical sense.

Mr. AUCOIN. Is it embarrassing to you to see it described in that fashion?

General MONAHAN. Yes.

Mr. AUCOIN. I would hope that our government wouldn't see, and this President wouldn't see, arms control as being a political countermeasure to any weapon system, including SDI.

General MONAHAN. I don't believe the President sees it that way.

Mr. AUCOIN. Good. Maybe that ought to be revised in terms of your budget justification, or ought not to be used in next year's budget justification.

You don't think it reveals anything about the thinking within the Office of SDI——

General MONAHAN. It doesn't reflect any of my thinking. I don't know whose thinking it reflects.

Mr. AUCOIN. I would like to know whose thinking it reflects as well. I guess we will never know.

General MONAHAN. Perhaps not. I don't know.

COUNTERFORCE FIRST STRIKE

Mr. AUCOIN. One final question. This has to do with first-strike advantage.

I have been one who has been concerned for years about giving one side or the other a first-strike advantage, a counterforce advantage. It seems obvious to me that at any given level of technology, the smaller the attack and the less well coordinated it is, the better SDI could do against it.

I think you would probably agree with that.

General MONAHAN. Yes.

Mr. AUCOIN. The smaller the attack and the less well coordinated, obviously the better SDI could do against that attack?

General MONAHAN. The less SDI perhaps required, certainly.

Mr. AUCOIN. It also seems obvious to me that a counterforce first strike is not going to be small and it is not going to be uncoordinated. It is going to be a lot larger. It is going to be very coordinated and more coordinated than retaliation would be, retaliation with whatever is left after the leakers get through.

So even if we set aside the use of a Soviet SDI being used offensively to express an American SDI, doesn't it follow that SDI would have an easier task in support of a Soviet first strike, that is mopping up our retaliation, than it would in our SDI blocking a Soviet first strike?

General MONAHAN. First of all, I don't understand how the Soviet—a Soviet strategic defense system is used offensively against us.

Mr. AUCOIN. What about using its inherent ASAT mode against our satellites? Early-warning satellites or SDI satellites?

General MONAHAN. You are talking about using it in an ASAT role?

Mr. AUCOIN. Yes, and coordinating that with an offensive launch where you are then shooting offensively against a blind victim.

General MONAHAN. You are thinking of the Soviet strategic defense system as an ASAT role.

Mr. AUCOIN. You have to look at capabilities. I remember what John Vessey told the committee. He said, "I am a soldier. I can't deal with motives or thoughts. I have to deal with capability."

There is an inherent capability there that could take out our early warning satellites if used first. It could take out our SDI if used first and if timed with an offensive launch. The only SDI left on the board would be the Soviet SDI, which would mop up whatever defenses we have left.

General MONAHAN. The space-base interceptors, Brilliant Pebbles, have a good capability against an ASAT. It doesn't care whether the booster has a nuclear weapon on it or whether it has an ASAT on it. ———.

Mr. AUCOIN. One last question on that subject because I don't want to lose this moment.

The whole history of this competition is one side get something, the other side ultimately gets it, too. We once had a MIRV advantage. We didn't think they would get it. They did. It is monkey see, monkey do. You are relying your answer on the Brilliant Pebbles. What happens when the Soviets get their Brilliant Pebbles?

General MONAHAN. ———.

Mr. AUCOIN. I return to the offensive capability of what we call defense. You still, then, have a potential first-strike technology that could be used against a potential victim if both sides have it.

General MONAHAN. If both sides have it, you are in a situation where you have more or less equal capabilities.

Mr. AUCOIN. But the point is you have the incentive to go first.

General MONAHAN. I don't understand why they would have the incentive to go first if they have equal capability with ours.

Mr. AUCOIN. Because they might fear that we would go first.

General MONAHAN. If they believe in their defensive system, why should they worry about our going first?

Mr. AUCOIN. Because if we have these capabilities ———.

General MONAHAN. Our SDI is not designed to be an ASAT system.

Mr. AUCOIN. But it has the capability——

General MONAHAN. With great modification. It would take a lot of modification to give it ASAT capability.

Mr. MURTHA. The time of the gentleman has expired.

Mr. Miller?

BRILLIANT PEBBLES

Mr. MILLER. Thank you, Mr. Chairman.

I read somewhere among the statements that we not have some 7,000 space units that are being tracked, and that Brilliant Pebbles would again have about ———. Am I correct on that?

General MONAHAN. First of all, I don't think that with Brilliant Pebbles, we would rely upon our ———. Brilliant Pebbles are designed so that they themselves know where they are at all times and they report that back. It takes a computer to keep track of that. I think more computers will be needed. I don't think we need more radars or sensors, but we probably need more computers.

Mr. MILLER. Some years ago, we sent a shot that I thought was a little foolish at the time, maybe it served its purpose. It consisted of steel needles that were spread out as I recall. Are they still there? Will they be a problem? Do we know where they are, if they are there?

General MONAHAN. I don't believe there are any—there is any such device in existence today, Mr. Miller, nor do I know of a program.

Mr. MILLER. This goes back among our early stages. We seemed to send up something that burst and in turn spread out steel needles.

The experiment was—I didn't think it was worthwhile, but I didn't have all the details on it.

General MONAHAN. I believe that is a concept that must be dropped somewhere along the line.

Mr. MILLER. Well, apparently it happened and we haven't heard much about it, very little about it.

General MONAHAN. I will check and see.

Mr. MILLER. If you could tell us something about it for the record, I would appreciate it.

Mr. AUCOIN. I think that is the homing overlay experiment that the gentleman is talking about.

General MONAHAN. I will take a check.

Mr. MILLER. If you would, thank you.

Thank you, Mr. Chairman.

[The information follows:]

The remains from the Homing Overlay Experiment (HOE) were reduced to dust particles after the fourth successful intercept mission. The dust particles were no larger than two inches in radar cross section and reentered the atmosphere in a 60 by 80 mile pattern over the Pacific Ocean.

The remaining available equipment from the HOE experiment consists of a kill vehicle shell, one infrared sensor and two data processors. The sensor and processor are in storage with Lockheed Corporation. The shell kill vehicle was donated to the Smithsonian. The Smithsonian has further loaned the shell to the Alabama Space and Rocket Museum in Huntsville, Alabama. The museum has it on display as an empty vehicle with the kill fan deployed.

Mr. MURTHA. Mr. Livingston?

COUNTERMEASURES

Mr. LIVINGSTON. Thank you, Mr. Chairman.

General, we seem to be mixing metaphors and confusing nomenclature here in an effort to prove points and I just want to make sure that I understand, in your mind and in the mind of the Pentagon, what are countermeasures?

Let's spell it out.

General MONAHAN. Well, countermeasures are those systems, in other words, hardware-type systems that have a purpose of reducing the effectiveness of a certain weapon, whatever it is meant to counter. Countermeasures may also come in the form of tactics or operational considerations.

Mr. LIVINGSTON. So to defeat SDI, you don't need political concepts, you need hardware; right? If you are going to defeat it in the actual operation?

General MONAHAN. Indeed.

Mr. LIVINGSTON. And if you do that, you don't use an SDI to beat an SDI. You don't use a Strategic Defense Initiative to beat a Strategic Defense Initiative. You use offensive weaponry; don't you?

General MONAHAN. Yes.

The two opposing strategic defense systems would be fighting each other.

Mr. LIVINGSTON. If we had ——— defensive fixtures in orbit and all of a sudden offensive weapons started taking them out, we would know pretty quickly, wouldn't we?

General MONAHAN. Immediately.

Mr. LIVINGSTON. And that would be a major act of war, wouldn't it?

General MONAHAN. It would be something close to it; no question.

Mr. LIVINGSTON. Particularly if it were followed by the firing of offensive missiles on the ground, which would likewise be detected before they knocked out the whole system?

General MONAHAN. Yes.

Mr. LIVINGSTON. And then we would be in a SIOP situation?

General MONAHAN. Yes.

Mr. LIVINGSTON. So, in effect, even if it didn't work against every missile they sent our way, it would be a very effective early warning system and we would be able to get our missiles off the ground?

General MONAHAN. Yes.

Mr. MURTHA. Before Mr. Sabo goes, do you have a report from the Budget Committee, about funding levels or anything?

Mr. SABO. No, just patience. Same question, same answer.

Mr. MURTHA. Mr. Livingston?

Mr. LIVINGSTON. So, in effect, my question was that even if it didn't succeed in getting every missile fired at us, it would be an effective early warning system?

General MONAHAN. Yes.

Mr. LIVINGSTON. Presumably they would not knock out all ——— instantaneously?

General MONAHAN. I don't think they could knock out all ——— over several months.

Mr. LIVINGSTON. If they had the very best offensive capability, if they had the very best offensive capability and Brilliant Pebbles were deployed, what percentage of our defensive items would they be able to knock out?

General MONAHAN. That is wholly dependent upon the size of their ASAT force. It would have to be absolutely huge to be able to take out ——— Brilliant Pebbles.

Mr. LIVINGSTON. If they had a huge ASAT force deployed, we would know it, right?

General MONAHAN. Indeed.

Mr. LIVINGSTON. We would know it well in advance. In fact, that would telegraph their intentions long before they were probably ever fired?

General MONAHAN. Absolutely.

Their ASAT's would only take out satellites that are ———.

Mr. LIVINGSTON. Because the Brilliant Pebbles concept is to enable those vehicles to avoid destruction?

General MONAHAN. That is one of the things they can do, yes.

Mr. LIVINGSTON. If, while all of that is going on, they are firing missiles from various parts of the world, at least some of those missiles are going to be knocked out of commission by our SDI system; right?

General MONAHAN. Yes.

Mr. LIVINGSTON. If they know that a significant percentage of their missiles are going to be knocked out of commission, that means that they have got to spend a great deal more money producing more major ballistic missiles if they intend to be successful in their offensive strike?

Mr. DICKS. No. that is correct. They are going to stop having offensive weapons. They are going to take them away because they will know they are not effective.

Mr. LIVINGSTON. I think the gentleman may be being sarcastic, but that, in effect, may be the outcome.

I want to finish where I am——

Mr. AUCOIN. I yielded to the gentleman.

Mr. LIVINGSTON. I will be happy to yield when the time comes.

Mr. MURTHA. Mr. Livingston?

Mr. LIVINGSTON. I want to make sure that I understand that if they know that a significant percentage of their missiles aren't going to get through and they want to have a successful first strike, they are going to either have to have a much larger number of offensive missiles or they are going to realize the futility of their actions and not rely on that type of system, aren't they?

General MONAHAN. Yes, indeed.

As a matter of fact, if you see the way we have laid out phase I of this program, recall I said it has 2 layers, a ground-based layer and a space-based layer. One of the reasons for having the layers is it greatly contributes to the effectiveness of the system. We plan for each layer to be ——— effective so that means that the combination of the two layers, ——— can get through.

Mr. LIVINGSTON. That is interesting because when you consider the totality of the cost of their offensive missile system versus the cost of a system like Brilliant Pebbles, what is the magnitude over and above the cost of the Brilliant Pebbles?

General MONAHAN. It can't even come close. I don't know what it costs them to produce a warhead ——

Mr. LIVINGSTON. ———?

General MONAHAN. Yes.

Mr. LIVINGSTON. In the range of a ——— the cost.

You are saying that this small investment of these vehicles flying around in orbit is a tremendous investment in terms of deterrence, in terms of defense, and in terms of making the Soviets spend money if they truly intend to be offensive ballistically?

General MONAHAN. Yes, sir. I think it probably forces them—they could quickly get to a situation where they couldn't possibly even do it if they had all the money in the world. ———.

Mr. LIVINGSTON. It sure sounds like a good investment to me. I yield to the gentleman.

PHASE I MISSION REQUIREMENTS

Mr. DICKS. Are you testifying that Brilliant Pebbles is going to be ——— effective?

General MONAHAN. Let me tell you what I am testifying, Mr. Dicks. We are testifying that we plan for each layer of the system to be ——— effective.

Mr. DICKS. Is this Phase I? This is a ———. The JCS requirements Phase I is ———.

General MONAHAN. The way that is achieved is that by having two layers which are ——— effective, as far as what they are able to do—you are looking at ———.

Mr. DICKS. But phase I is not just Brilliant Pebbles. It also would be your Eris and Hedi.

General MONAHAN. That is right. They have two layers.

Mr. DICKS. You are saying that those combined—you are talking about those as two different ——— are you?

General MONAHAN. I am.

Mr. DICKS. You are testifying that in Phase I, we are going to be able to get ———?

General MONAHAN. No, sir. We only get a total of about ———. That is the way the system is sized. If you want to get more———

Mr. DICKS. ———. You are saying ——— of the JCS phase I requirement.

General MONAHAN. That is right.

Mr. DICKS. Not ——— of the entire job.

General MONAHAN. That is right. The system is designed such that if you wanted to then add to it more interceptors, you become limited in the number of interceptors.

If you want to add more interceptors and you have unlimited—if you want to add more, you can get ——— if you want to.

Mr. DICKS. Can you tell us what those numbers are to get to ———?

General MONAHAN. I don't know if an analysis has been done on that.

Mr. DICKS. When you talk to the Soviets and you talk about this system, what they fear is that the United States is, in fact, attempting to develop a first-strike capability.

The way they view it is that between our SLBMs, which we are going to have 20 boatloads of D–5 missiles, all of which have hard-target capability, you have your MXs, your Midgetman. You have the Minuteman IIIs ——— what they are fearful of is that we will have the ability to strike first, devastate their offensive retaliatory capability and then have enough defense to soak up their attack, their possibility of a retaliatory attack.

That is what causes crisis in stability. If they are fearful of their having a credible deterrent, it does not enhance deterrence, it, in fact, erodes and undercuts deterrence.

Do you quarrel with that?

General MONAHAN. I could look at that just a little differently.

The very fact that we have a strategic defensive system, it doesn't seem to me would prompt them to launch a preemptive attack on us or a first-strike attack, an attack without warning, either because they know that first of all they are going to have difficulty getting through the defensive system; and secondly, they are inviting massive retaliation.

Mr. DICKS. They have a defensive system as well.

Let's say we are on an equal playing ground now. With the number of these systems still being silo-based on both sides, I think you could argue that there is an enormous incentive to go first with a bolt out of the blue attack where you would then kill a large number of the other fellows' retaliatory forces in the first strike. Then if you have a defensive system, the other side is going to view it as not only can they strike first with enormous advantage in terms of the number of RVs killed, but then they would have a defense to soak up the response.

That is why a number of us worry that rather than enhancing stability, that, in fact, erodes both sides' confidence in their deter-

rence and, therefore, it doesn't contribute to stability, it creates crisis instability.

In a crisis situation, you have compounded the problem by making it enormously more important to go first and that is what we worry about in this whole concept.

I want to make sure you understand why there are concerns up here. It isn't necessarily that we don't like defense. It is, does it enhance stability? Does it add to our national security? If you put a defensive system in that enhances crisis instability, I don't think you have done a service to the country. That is why I hope in this strategic review that this concept of defense is looked at thoroughly because I think we want to make the right decision.

You are going to be the fellow in charge of this program. You are going to have to justify it. I think it is important that you understand what we think are legitimate concerns. It is not that we are against defense. It is only if it is going to help us in the strategic equation.

Some believe over the last 40 years as bad as the concept of mutually assured destruction is, it has worked. It is an unpleasant reality that we are vulnerable to attack, but both sides avoid getting into a confrontation. So when you change that basic fundamental question, it seems you have to be very careful in what you are doing.

I think people in the Administration understand the concerns very well, particularly the head of the National Security Council and I think you will have to talk to him about this as this analysis gets down to completion.

Mr. LIVINGSTON. Reclaiming my time——

Mr. DICKS. Thank you for yielding.

Mr. LIVINGSTON. I want to make the point that mutually assured destruction has indeed worked insofar as it pertains only to the major super powers. But we are now in a new dynamic and there are other countries which either are not or will soon be capable of sending ballistic missiles our way and I don't think that mutually assured destruction is the ticket which will answer those threats. That pertains to those remarks we made earlier in my colloquy with Mr. AuCoin. We may well deter the Soviets from trying to blow up the world, but we are not likely to deter the Ayatollah.

Mr. AuCoin, I promised I would yield to you.

Mr. AUCOIN. My friend from Louisiana has set a record for controlling the time both in the room and out of the room and back again. I want a plaque on the floor to mark this occasion.

General, developing further Mr. Dicks' point, that the inherent offensive ASAT capability could be coordinated with the traditional offensive assets of the other side and coordinated together, you could have the satellites that we have for SDI as well as early warning put at risk by their SDI because of inherent offensive capability and at the same time an offensive launch.

That gives you the crisis instability Mr. Dicks talked about. When I was discussing that with you, you indicated that there would have to be significant retrofitting in our space assets or defensive space assets in order to have that offensive capability. I am not going to ask you to respond to that today, but I think that is a

very significant point, that there isn't an inherent effective offensive capability in the SDI that we are pursuing.

I would like you to spell out for the record the extent to which there would have to be significant retrofitting in order to have that offensive capability that I believe and Mr. Dicks believes is intrinsic and inherent in the system. That is a significant point, because if it is inherent, then it obviously can be used though the Russians may call it defense until they are blue in the face, it can be used as an offense.

[The information follows:]

The Phase I Strategic Defense System (SDS) will have no offensive capability to attack or destroy terrestrial targets. To provide such capability would require a massive system redesign—in effect, a new system—to enable the SDS to use terrestrial targeting data provided by other non SDS sources or a redesign which would reorient the SDS sensor system to permit terrestrail target acquisition. Another nontrivial requirement would be a command and control retrofit which would allow the system to be directed against terrestrial targets. Finally, the current space based interceptor would have to be redesigned to permit penetration of the atmosphere. Such an interceptor design would involve, at a minimum, different onboard guidance, a new much heavier, impacting front end and new processes to compensate for the rigors of reentry through the atmosphere. These redesign activities would, of necessity, be followed by an extensive test program to determine if sufficient accuracy could be achieved and if the kinetic energy of the impacting, nonexplosive warhead would be adequate to hold terrestrial targets at risk. Given the nature of the changes necessary to attack terrestrial targets, it would be unlikely that the system would still retain equivalent capability against ballistic missiles.

The bottom line, therefore, is that while it might be theoretically possible to redesign the space based interceptor to permit offensive attacks, it would be technically impractical. An interceptor that could penetrate the atmosphere would be a new design—a radically different missile, both hardware and software.

General MONAHAN. When you say used as an offensive capability, retrofit, I believe I said modification, not retrofit. We would have to modify our program as it exists today.

Mr. AUCOIN. If it is not operable now effectively, I would like to know what would be required because I think it is effective now.

Mr. MURTHA. Let him discuss it and then we will continue.

ASAT CAPABILITY

Mr. DICKS. Last year, we were told by General Abrahamson that SBI had an anti satellite capability. That was the testimony.

Are you telling us that something has changed?

General MONAHAN. I said the program would have to be modified in order to do that.

Let's take the ground-based portion of it first. The ground-based interceptors being developed do not have ASAT capability. Could they be modified to do so? Yes, they could. I don't know how long it would take or how much it would cost, et cetera.

Mr. MURTHA. What would be the magnitude of modification?

Mr. AUCOIN. I don't think it is possible for you to say that.

General MONAHAN. I don't know as of the moment, Mr. Murtha.

For example, the experimental version of the ground-based interceptor, the ERIS, is launched off the second and third stage of existing Minuteman boosters. ———. It has the inherent basic characteristics, but it would require modification.

Mr. DICKS. Admiral Crowe said its priority for the whole defense establishment is to get an anti-satellite weapon. That is why we are asking these questions.

STRATEGIC WARNING

Mr. MURTHA. Let me just ask a question here.

Mr. Dicks was asking about a bolt out of the blue. When we were out of SAC, General Doyle was convinced it was ——— warning before we would have any attack. He was not worried about a bolt-out-of-the-blue attack. He came in here and he modified that a little bit to ——— which is, of course, much ——— than we had anticipated. In your job, what do you see as the most—the shortest possible attack of, say, ICBMs? He said they were ——— on alert.

Mr. DICKS. I think he said that within ——— that they could launch all their ICBM's,

General MONAHAN. The Soviets could—perhaps. It would take some amount of time, I don't know how long it takes to generate all of them.

Mr. DICKS. ——— like ours are.

Mr. MURTHA. On what basis do you formulate your defense in beating an attack? He seems to feel they couldn't attack us without giving us significant warning.

General MONAHAN. Yes.

Mr. MURTHA. Are you basing SDI on that warning system?

General MONAHAN. I believe SDI is kind of ready to go at any one time. The spaceborne assets are up there and they are on alert 100 percent of the time.

Mr. MURTHA. You will not need any warning?

General MONAHAN. We would be postured such that you wouldn't need—you would be able to respond to a bolt out of the blue. But in the normal peace-time situation, we might well say that we don't want to keep all those ground-based interceptors on alert, we might pull some down for maintenance. For example, we only keep 30 percent of our strategic bombers on alert. We could put 60 or 70 percent on alert if we wanted, but we judge that 30 percent is sufficient. Ground-based interceptors we may decide to put a certain number on alert in a period of time with ability to call up the remainder in a certain period of time.

Mr. MURTHA. I am trying to get back to what you consider a bolt out of the blue. What does that mean to you? You are our defensive expert.

General MONAHAN. A bolt out of the blue, to me, means a completely unanticipated attack with zero warning, the first that you know of it is when you detect missile launches out of the Soviet Union.

TACTICAL WARNING

Mr. MURTHA. How do you model your defense to take care of that kind of attack?

General MONAHAN. I think by its very nature it takes care of that attack. We will have ground-based sensors on alert. The satellites that are doing the booster surveillance looking for the missiles being launched, those are on alert 100 percent of the time.

Mr. MURTHA. So we would have to seriously consider that as a concept. I have always believed we would have some kind of a warning.

General MONAHAN. I do, too. I am saying it can handle a bolt-out-of-the-blue attack.

Mr. DICKS. With man in the loop?

General MONAHAN. Yes.

Mr. DICKS. Could you explain that a little bit?

General MONAHAN. Let me get to one point. It can handle a bolt-out-of-the-blue attack. I personally don't think a bolt-out-of-the-blue attack has much likelihood at all. I think it is very, very unlikely that they would do so because the retaliation. As soon as they start making any sort of preparation, that is no longer bolt out of the blue. If they don't make preparation that means we are going to get a lot of their submarines in port and their bombers on the ground. So I think a bolt-out-of-the-blue scenario is very, very unlikely. An irrational act on their part, I think, because they are probably far better off by posturing themselves.

Mr. AUCOIN. How would you handle it, as unlikely as you feel it would be?

General MONAHAN. We have 90-some percent of our own strategic missiles that are on alert constantly and they are there because of the possibility of a bolt-out-of-the-blue.

A certain percentage of our submarines are at sea and a certain percentage of our strategic bombers are on alert and that is there to hedge against a completely surprise attack.

Mr. DICKS. Do you want to get into—the bolt out of the blue?

General MONAHAN. With man-in-the-loop.

Mr. DICKS. Explain to us how that is going to work?

General MONAHAN. In the handout here, there may be something—we have a classified investigation. It is one of the charts and it shows the time lines of a ballistic missile in flight.

Mr. MCDADE. What page are you on?

General MONAHAN. I am trying to find it right now. Page numbers 31 and 32.

How would you handle the bolt-out-of-the-blue attack, I believe, is the question. Look on page 13, you note first of all, we have broken up the flight of the ballistic missiles into four phases, boost, post-boost, mid-course, and terminal, and the amount of time there in each one of those phases. In the post-boost phase, about ———. So we have then the remainder of time here in which to, well, first of, to launch our own ballistic missiles, you have until the first impacts would arrive in the United States to——

Mr. DICKS. Which is 30 minutes, basically?

General MONAHAN. That is correct. For our space-borne system to attack them, we ought to attack as soon as we could. The earlier you can attack them in the boost phase, and the post-boost phase——

Mr. DICKS. How is that decision going to be made?

General MONAHAN. We don't know the answers to that just yet. It is a good issue and needs to be worked out. I think it is very appropriate that the problem is not solved as of this time.

Mr. DICKS. If you are developing a system to be highly effective in the boost phase, getting that clearance to attack is critical. We are talking here about ———?

General MONAHAN. Absolutely.

Mr. DICKS. There has to be something worked out as long as it is simultaneous, because every second lost, you lose an opportunity?

General MONAHAN. That is correct. For those first lost.

Mr. DICKS. The ——— include improvements that could be made?

General MONAHAN. No. That is one possibility, of something they could do; build a booster that is a faster booster.

Mr. AUCOIN. What about the SS–25?

General MONAHAN. ———.

Mr. AUCOIN. The Office of Technology Assessment indicates that ———?

General MONAHAN. Okay. This is a typical SS–18, right here. ———.

Mr. AUCOIN. You have the 25 coming, and this doesn't in the boost stage, take out the 25. If that is burn on the 25, it beats you in the boost phase?

General MONAHAN. All I am saying, that is what the boost phase would be. If you draw this to reflect a SS–25 under boost area, you would put in ———. All that says is you have a shorter time in which to attack them.

Mr. AUCOIN. Does that mean we have to do anything differently, make more robust our system in order to do that?

General MONAHAN. Not necessarily. As long as the Brilliant Pebbles can attack when it is traveling ——— per second plus the velocity that it gets from being in orbit.

Mr. AUCOIN. The Office of Technology Assessment indicates burn times of ——— or less, would render useless those boost phase defenses based on ———.

General MONAHAN. I don't necessarily agree with that at all.

Mr. AUCOIN. Is that part of what you classified?

General MONAHAN. I don't know what that comes out of.

Mr. AUCOIN. That is one of the chapters—General, wait a minute. That is in one of the chapters that you have classified and therefore——

General MONAHAN. That is not the reason I classified it.

Mr. AUCOIN. Can that be released?

General MONAHAN. I don't know. I would have to go back and check.

SOFTWARE VIRUSES

Mr. MURTHA. Let me ask you, General, on the software in the computer. With the serious problem we have been having with other computers, is this going to cause us a problem in detection, in relays? What are we doing about it?

General MONAHAN. Well, first of all, we are having the National Security Agency do a double check on us to be sure we are not vulnerable to the viruses and we take all necessary protective measures.

Mr. MURTHA. You are vulnerable, there is no way you are not. I don't see any way you wouldn't be vulnerable. If somebody manufactured it they could have put a delayed virus in the system.

But you are looking into it?

General MONAHAN. Yes. That is why we are getting an independent agency to do it. The National Security Agency will look at that for us. Besides that, the software is designed to be robust, it has parallel paths, redundancies built into it, and those sorts of things.

Mr. MURTHA. So you feel that the 30 minutes that you have to notify the President would be reasonably sure, he could make a decision knowing that the information he received was accurate? You wouldn't have the confusion and the problems you had with the VINCENNES, where he fired inadvertently? We have enough safeguards to protect against that kind of firing?

General MONAHAN. Yes, sir. First of all you put man-in-the-loop, that is what you do.

Mr. MURTHA. In this case, the VINCENNES——

General MONAHAN. Excuse me?

Mr. MURTHA. The information was accurate, but they misinterpreted it. I am saying we have that kind of safeguards where either a virus, whether a bad computer or the man could make a mistake. Are we sure enough of this whole system that the man-in-the-loop wouldn't fire inadvertently?

General MONAHAN. First of all, at this stage of development in the program we are doing all the things necessary to work that problem, they aren't done yet, and they aren't tested yet, but we are doing what we have to do to work that problem to make sure it is taken care of.

Mr. MURTHA. So those computers you are building, you are keeping the virus out of them and they are going through the system to make sure someone can't insert a virus into this?

General MONAHAN. Yes.

Mr. AUCOIN. I would hope they would try to do the same thing with the existing systems that were infected by the virus, but it didn't work there. How do we know that prevention won't work here?

Mr. MCDADE. Just one point, General. In this concept we are talking about, we are talking about us retaliating against the Soviet missile, we are not talking about launching a missile?

General MONAHAN. That is right.

Mr. MCDADE. We are talking about our sensors indicate an attack and an attempt to retaliate by destroying the incoming vehicle?

General MONAHAN. That is right.

Mr. MCDADE. There is a fundamental difference when we talk about it that way?

General MONAHAN. Right. The system has no capability, it only has defensive capability. All it can do is shoot down ballistic missiles. If I modify it it can shoot down satellites. It can't attack the Soviet Union at all.

Mr. MCDADE. Thank you, Mr. Chairman.

Mr. AUCOIN. Mr. Chairman?

Mr. MURTHA. Mr. AuCoin.

Mr. AUCOIN. Mr. McDade just asked a question that I wanted to dovetail on. The advertised purpose of the SDI is to do what Mr. McDade said, I accept that. And your chart on page 13 is a demonstration of that. But let me just add two things. If my colleagues would turn to page 13, here is what Mr. Dicks and I are trying to

bring out today. Draw two circles up there, one in the left and one in the right, put EW for early warning/SDI in those circles representing all early warning assets and our SDI assets.

Then put the same thing over on the Soviet side, early warning assets, SDI assets. That is the full picture, if we let this thing go to the point we get a SDI and ultimately they get a SDI.

I want to suggest if we get to that point, and if we build a SDI they are going to build one, too. If that is the case, then here is the full picture with these two things drawn in.

SURVIVABILITY OF SDI SYSTEMS

Let me suggest to you that the first move is not going to be as you have done it on the chart, the first move is not going to be this boost with the Soviet offensive weapons. The first move on the board is going to be the offensive use of what they and we call defensive SDI systems, and that will be a move like this, aimed at our early warning assets, aimed at our SDI, choreographed with an offensive launch which leaves you with, leaves them in a position of attacking a blind victim. To the extent we can mount a retaliation, whose SDI is left on the board? Ours is not, theirs is. Their SDI then can mop up whatever feeble retaliation is left after we have been blinded and hit. That is the crisis instability the Gentleman from Washington was talking about. Conceptually, that is the problem with SDI?

General MONAHAN. But that fundamentally depends upon the effectiveness of their attack against our defensive systems.

Mr. AUCOIN. Let me ask you——

General MONAHAN. A successful attack.

Mr. AUCOIN. With directed energy weapons and the rest, which is the easiest task, to take out those soft satellites, or to take out those rapid-flying small miniature warheads, RV's coming—I think this is the easier task.

General MONAHAN. I think the most difficult task is to take out ——— Brilliant Pebbles.

Mr. AUCOIN. What you would do to counter that is ———? As the Office of Technology Assessment indicated in its report, once you ——— according to this, you correct it if I am wrong, for the record, correct the Office of Technology Assessment, but it says that it takes that off the board.

Now let me just tell you why——

Mr. DICKS. Let him answer that one.

Mr. MURTHA. Let him reply.

General MONAHAN. First of all, I don't necessarily agree ——— makes Brilliant Pebbles ineffective.

Mr. AUCOIN. Why not?

General MONAHAN. I can think of what is so magic about ———. What do I do to counter that? I can think of something sitting here, but having not thought about it before, and that is ——— in the Brilliant Pebbles. I can do that by ———. There are ways of handling that kind of situation. You can do a Red and Blue team analysis of the whole thing to sort that out.

Mr. MCDADE. General, the OTA report I think is about a year and a half old. How old is the concept for BPS?

General MONAHAN. I don't know.

Mr. MCDADE. I think the report was done prior to—verify that if you can, will you? Or tell us is that accurate?

Mr. DICKS. Will you yield for clarification? I though you said to us this was mostly a boost phase weapon.

General MONAHAN. That is right.

Mr. DICKS. Do you have to get it in the boost phase?

General MONAHAN. No. You want to get as many in the boost phase as you possibly can. That is when they have all the warheads on board. So Brilliant Pebbles would get more in boost phase than anything else.

[CLERK'S NOTE.—Classified discussion removed.]

Mr. AUCOIN. For the record, I would like to review, you and your staff, to review the OTA, the discussion on that in the OTA report which is classified, but review it and counter it for the record. I would like to see that discussion.

General MONAHAN. I would be happy to do so, sir.

One other thing about Brilliant Pebbles. Whereas it is most effective to attack in the boost phase it may attack in the post-boost phase. Hopefully we can make an attack in the mid-course phase and you can talk to the people at Livermore and they will give you a scenario ———. Okay? Which kind of surprised me, but they have a scenario in which that could be done.

Nobody has evaluated that at the present time, and I am not ready to sign up and say it could be done for sure, but don't limit it the effect of Brilliant Pebbles to just that boost phase ———. First of all, I think——

Mr. MURTHA. We appreciate your testimony. You will have to work with the committee though, in the end, because the figures are not going to be at $5–7 billion, that is for sure. We are going to be looking for money everyplace and these things are theoretical and probably as vulnerable as anything we have to cut. So we appreciate very much your patience with us. You have been very helpful to all of us today.

The gentleman from Washington.

LIMITED PROTECTION SYSTEM

Mr. DICKS. Last year, there was much discussion about the possible accidental launch protection system, which is now being called limited protection system. The goal of such a system would be to provide some near term capability from ground based interceptors. This would be far short of Phase I systems objectives. What is the status of the congressionally directed review of the feasibility of a LPS system and when will it be submitted?

General MONAHAN. Well, Mr. Taft sent a letter over here a couple of weeks ago to the four committee chairmen explaining whereas we had done the work on the status report that he wanted, to hold off in submitting it to the Congress until such time as the strategic review had been completed.

Mr. DICKS. General Abrahamson's end of the year tour report described a specific LPS option would be explored in an exploratory fashion ———. This would be treaty compliant according to the General. Would you describe this option and give us your opinion of it?

General MONAHAN. I read the report I guess once, maybe two times. I am trying to remember off the top of my head what that said. I think if had something to do with putting ——— something of that sort. Let me give you my answer. We have not taken a good hard look at the feasibility of doing that.

Mr. DICKS. But something like that will be discussed in the LPS report?

General MONAHAN. It should be. The report should look at——

Mr. DICKS. Let me ask you this question. It seems to me with limited resources if you go to this kind of system it is going to take money away from a Phase I. So I assume that you all aren't wildly enthusiastic about this kind of an approach?

General MONAHAN. I want to keep a very open mind to all approaches as we go through this review and the budget review. That is a candidate along with many others.

Mr. DICKS. In its April 1988 report didn't the Defense Science Board suggest an LPS as the first step in SDI's phased deployment?

General MONAHAN. As I recall from the report, they said that it is one way it could be done. True.

Mr. DICKS. Do you concur with that approach, or do you want to wait a while?

General MONAHAN. I would like to wait until we complete this strategic review and I think more things will come to light to help me and others make up our minds.

Mr. MURTHA. Thank you very much.

Mr. DICKS. I have a couple of questions for the record.

Mr. MURTHA. We have a number of other questions for the record. Thank you once again General for appearing before us today.

[CLERK'S NOTE.—Questions submitted by Mr. Dicks and the answers thereto follow:]

PENETRATION AIDS

Question. The SDI annual report to Congress discussed continued Soviet strategic defense efforts and once again hints that these efforts may bear fruit in the very near future. Nonetheless, the United States has not embarked on an aggressive program to see if such a system could be countered through penetration aids or options such as maneuvering warheads. In fact, during the presidential debates, President Bush cited Minuteman penetration upgrades as the only system he could think of to cancel, although it already had. Can you explain the apparent discrepancy in this situation?

Answer. Budget restrictions have reduced the capability to proceed with a new, aggressive penetration aids program, but major efforts are underway in optical discrimination countermeasures, as well as the decoys, electronics, and guidance systems for maneuvering reentry vehicles.

Question. What coordination, if any, does SDIO have with other elements in the Department tasked with assuring that strategic offensive forces can reach their assigned targets? Do you provide information that may be useful based on your assessment of potential Soviet countermeasures to SDI systems?

Answer. The SDIO Countermeasures Program office provides information based on the assessment of potential Soviet countermeasures in two ways. First, results of analysis and experiments are provided to the Intelligence Community for incorporation into the threat documentation that is available to the agencies responsible for the success of U.S. offensive forces. Secondly, the USAF Ballistic Systems Division (BSD) which is responsible for the development of U.S. offensive missile systems participates in the Countermeasures Program's technical analysis activities and the Red/Blue Team interactions. BSD also assists in establishing requirements for, and helps in defining appropriate candidate countermeasures experiments and the programs to validate countermeasure effectiveness. Through these avenues, data on potential Soviet countermeasures is made available to other elements in the Department responsible for strategic offensive forces.

SUPERCONDUCTING MAGNETIC ENERGY STORAGE (SMES)

Question. What is your latest schedule for making the decision on the down selection for SMES?

Answer. The initial down selection to five sites in subsequent analysis was announced in May, 1989. The final selection is scheduled for 1990.

Question. Does the funding level approved upon by Congress for SDI in FY 1990 affect the SMES project in future years?

Answer. The revised budget request is essential to a viable research program. The extent to which specific projects would be changed depends upon the final appropriation.

TECHNOLOGY SPINOFFS

Question. One of the values often cited from SDI is from technology spinoffs. It appears that the revitalized interest in ASAT weapons is based primarily on ERIS technology being developed by SDI. How does SDIO coordinate with the Services in structuring a program such as ERIS to look at potential antisatellite applications and how should funding be shared in such an effort?

Answer. The revitalized interest in ASAT is based on a validated threat, not the availability of relevant technology. USCINCSPACE has determined that the capability to negate hostile satellites is a military requirement and its development is in the national interest.

SDIO is not involved in the structuring of an ASAT program with any of the Services. The Army, which has been assigned by the Secretary of Defense as the interim lead Service in a Joint Program Office (JPO), has established the JPO at the US Army Strategic Defense Command in Huntsville, Alabama.

The technology being developed for SDI exoatmospheric interceptors, including sensors, avionics, propulsions, etc., could likely be incorporated into any ASAT design. However, the differing threat parameters and battle space requirements for the ASAT versus the Strategic Defense System (SDS) will tend to limit the type and degree of technology transfer between the two efforts.

Question. What other SDI programs have potential ASAT application and how are they being treated?

Answer. The SDIO directed energy technology programs may also contribute technology to a future ASAT system. The SDIO maintains a Technology Applications Office specifically designed to assure other military applications of SDI research.

Question. As you know, we face a very difficult situation with respect to the Department of Energy's efforts to sustain and modernize the nuclear weapons production complex. One possible technology that has been promoted for producing tritium is the linear accelerator. The only current active government work in this area is being done for SDI. Have you looked at the possibility for applying this technology to DOE purposes, and what changes would have to be made in the program to allow an accelerated examination of this option? Would this entail sacrifices in potential SDI mission?

Answer. The basic linear accelerator technology, which is being developed for the NPB program, has potential applicability to tritium production with linear accelerator technology. But, tritium production should be implemented by DOE, not SDIO. In addition, application of the technologies are significantly different; a common program as implied in the question would be a mistake.

[CLERK'S NOTE.—End of questions submitted by Mr. Dicks. Questions submitted by Mr. Hefner and the answers thereto follow:]

SDI COST ESTIMATES

Question. In your statement you said the current estimate of the total cost to demonstrate, validate, develop and deploy the first phase of a strategic defense system is $69 billion. This sounds like an all inclusive figure. Does this include any money previously appropriated?

Answer. The $69 billion 1988 estimate includes Dem/Val, FSD and Production costs (i.e., Acquisition costs) for Phase I SDS. Launch is included. Fiscal year 1987–89 effort ($1.9 billion 1988) previously appropriated for Phase I is included. Technology Base, Phase II and III elements and Operation and Support costs are not included.

Question. I assume this includes the launch cost as well as the operation and support cost to maintain this system, is that right?

Answer. The estimate does include the cost to launch SDS Phase I. It does not include O&S, as this is an Acquisition estimate. The estimated annual steady state O&S costs are $2.8 billion (constant fiscal year 1988), which are established after an initial O&S build-up totaling $7.2 billion 1988.

PHASE I MISSION REQUIREMENTS

Question. How effective do you estimate this system will be?

Answer. The Phase I SDS will meet the requirements as given by the Joint Chiefs of Staff Memorandum 93–87 dated 23 June 1987. In this respect the Phase I SDS is highly effective—it increases Soviet uncertainties regarding a weapon's ability to penetrate the defenses and destroy US and allied targets. The Phase I SDS is the first step toward the long-term objective of a thoroughly effective defense that will protect the United States and its allies from the threat of attack from ballistic missiles.

GSTS SYSTEM

Question. You described the Ground-Based Surveillance and Tracking System (GSTS) as a rocket launched sensor system boosted into suborbital flight to provide tracking and discrimination in the Midcourse Phase. I believe you also stated this GSTS would not be launched until after the threat is launched. That doesn't allow much time, can we respond that quickly?

Answer. There are two ways to interpret this question. The first way concerns readiness of the GSTS, i.e., how much warning is required prior to launch. The current baseline requires some GSTS be in a launch readiness condition, some be in standby (brought to readiness in an elevated DEFCON) and spares at each basing site. However, the added cost to the total life cycle cost of maintaining all the GSTS (other than the spares) in a launch ready condition is minimal. Therefore, the majority of the sensors at each site can be in a launch ready state.

Question. How much time does this give us?

Answer. The second interpretation of this question involves the GSTS engagement timeline. In this case, the time to station is about 2–3 minutes, and the time on station is about 15–20 minutes. Since the GSTS is not typically used until about 10 minutes into the conflict, and since the typical ICBM takes about 10 minutes to reach the earliest GSTS acquisition range there is plenty of time to choose the best launch time, launch azimuth, and flight path.

SPACE LAUNCH CAPABILITY

Question. When the U.S. Space Command CINC was here he expressed concern that it takes United States 4–6 months to launch a satellite and it takes the Soviets as little as 4 hours I believe he said. Can we achieve this short notice capability?

Answer. The United States could match the Soviets in rapid launch ability if it so chooses. The United States has no requirement to launch satellites within hours. Four to six months is excessive and the US is taking action to reduce this to days rather than months. The Advanced Launch system (ALS), currently being developed by DOD and NASA, will have the capability to change out and launch a satellite within 5 days (assuming the satellites are designed to meet this criteria). Achieving rapid launch rates would require development of facilities; launch vehicles; and more importantly, satellites that can be launched on short notice—such systems do not currently exist. It should be noted that launch rate is not necessarily the proper criteria. The important criteria is mission, not launch capability. The US achieves mission capability by having more complex, longer lived spacecraft while the Soviets rely on less capable, shorter lived satellites. Thus, they require more launches and faster turn around time for launch to get the same level of effectiveness. It should be noted that the Soviets have been willing to make a major investment in new launch vehicles and facilities over the last 10 to 15 years while the US has done little. Consequently the Soviets, with a surplus in launch capacity, can embark on almost any future space endeavor without being constrained by launch capacity. The US has little or no excess capacity beyond performing current missions, much less adding new ones.

This lack of capacity is and will continue to impact future space activities. The ALS will greatly enhance future US space activities.

[CLERK'S NOTE.—End of questions submitted by Mr. Hefner. Questions submitted by Mr. Sabo and the answers thereto follow:]

EFFECT OF FISCAL YEAR 1990 BUDGET CUTS

Question. Your budget request for fiscal year 1990 totals $5.6 billion, plus some $350 million that is not within the jurisdiction of this subcommittee. As you know, the Congress has never appropriated the amount requested for the SDI Program. What would be the effect on your program if the budget were maintained at last year's level?

Answer. A reduction such as suggested would force a drastic restructuring of the SDI program, including termination of major partially-completed experiments, contract renegotiations with subsequent lay-offs, and a substantial delay in obtaining program objectives critical to our national defense posture in the future.

SDI'S PROPOSED SCHEDULE

Question. What is the philosophy behind your proposed schedule? Assuming that our existing and planned nuclear forces will continue to deter Soviet attack, with or without SDI deployments, and that the Phase One system cannot defeat the entire Soviet nuclear arsenal, would a delay of several years in the ultimate deployment date for the first SDI systems have any real affect on our national security?

Answer. The research program is currently structured to complete the demonstration/validation portion of the Defense Acquisition process for the elements of Phase I of a Defensive System. With adequate funding, the research program is planned to support an informed decision by the President or the deployment of strategic defenses within the next four years. Deployment of the Phase I system would follow and occur in the late 1990's with adequate funding. Such a system would enhance deterrence and strategic stability.

SCOPE OF SDI

Question. Former SDIO Director Abrahamson has suggested that the Strategic Defense Initiative, the Air Defense Initiative, and all anti-satellite weapons programs be consolidated within the SDIO. Do you think there would be any advantages to that kind of organization?

Answer. The SDI program is not chartered to include research into defense against the so-called air breathing threat, nor for ASAT research. We have not examined possibilities for consolidating those research efforts within SDI.

PHASE I COST ESTIMATES

Question. On Tuesday, the General Accounting Office released a review of the SDIO's latest cost estimate for its Phase I deployment scheme. The GAO stated "the $69.1 billion cost estimate . . . is dependent on the validity of a number of assumptions, some of which we believe may be optimistic. Department of Defense (DoD) inde-

pendent cost analysts also believe some of the assumptions are optimistic." What is your view of the GAO study? Do you disagree with their conclusion?

Answer. The DoD Cost Analysis Improvement Group's concerns that the GAO shared were: "Achieving the 'business as it should be' assumptions for production costs remained a significant challenge, and schedules remained optimistic."

"Business as it should be" refers to the changes in producibility that SDIO anticipates for SDS Phase I. These changes are expected to occur as a result of early emphasis on design for producibility, significant planned investment in plants and procedures, novel system requirements such as mass production of identical (as opposed to "one of a kind") satellites and very high-rate satellite production.

SDS Phase I schedules are the result of analysis based on historical data and planned element program characteristics. These schedules are well within the feasible range based upon what has been accomplished in the past. We are confident that, with proper management and funding stability, they can be realized.

Question. How much funding will be necessary, on an annual basis, for the years during which Phase I systems will be in production?

Answer. No decision on a specific architecture has been made. At present DOD is developing options for strengthening deterrence and stability through the deployment of strategic defenses based on advanced technologies. Were the President to decide to deploy an SDS similar to the Phase I system presented to the October 1988 DAB, production costs would be approximately $68.4 billion (1988) over a 15-year period.

Question. The $69 billion cost estimate is in fiscal year 1988 dollars. What does that mean in then-year dollars?

Answer. The acquisition cost estimate for a Phase I SDS, which includes the cost to demonstrate, validate, develop, produce, and deploy the Phase I system, is approximately $69 billion in constant 88 dollars. Using the accepted inflation index, $69 billion may equal $89 billion in then year dollars.

Question. Does the $69 billion estimate include the cost of anything beyond research and development, and production? For example, does it include the cost of launching the space-based elements into orbit? Most estimates for major strategic weapons systems include a projection for operation and maintenance for a specific period, usually ten years. Does the Phase I estimate include these costs?

Answer. The estimate includes all costs to demonstrate, validate, produce and deploy SDS Phase I. The launch portion of the $69.1 billion (constant fiscal year 1988 dollars) estimate was $8.6 billion. The cost of the O&S phase of the system is not included in this acquisition estimate.

Operation and Support costs are estimated to be $2.8 billion per year at steady state. The total operation and maintenance costs are, of course, a function of the total number of years of operation. The steady rate O&M cost occurs after a "ramp-up" which totals $7.2 billion fiscal year 1988, resulting in a total cost of $35.2 billion

fiscal year 1988 for operations and support from initial delivery to FOC plus ten full years beyond FOC.

ARMS CONTROL COMPLIANCE

Question. You stated in your testimony that all SDIO tests planned for the next two years will be in compliance with the Anti-Ballistic Missile Treaty. Who makes that decision? Are non-DoD officials involved? If there is a conflict between different agencies, who makes the final decision?

Answer. DOD has in place an effective compliance process (established in 1972, after the signing of the SALT I agreements) under which key offices in DOD are responsible for overseeing SDI compliance with all United States arms control commitments. Under this process the SDI Organization (SDIO) and armed services ensure that the implementing program offices adhere to DoD compliance directives and seek guidance from offices charged with oversight responsibility.

Specific responsibilities are assigned by DOD Directive 5100.70, 9 January 1973, Implementation of SALT Agreements. The Under Secretary of Defense for Acquisition, USD(A), ensures that all DOD programs are in compliance with United States strategic arms control obligations. The Service Secretaries, the Chairman of the Joint Chiefs of Staff (JCS), and agency directors ensure the internal compliance of their respective organizations. The DOD General Counsel provides advice and assistance with respect to the implementation of the compliance process and interpretation of arms control agreements.

DoD Instruction S-5100.72 establishes general instructions, guidelines, and procedures for ensuring the continued compliance of all DOD programs with existing arms control agreements. Under these procedures, questions of interpretation of specific agreements are to be referred to the USD(A) for resolution on a case-by-case basis. No project or program which reasonably raises a compliance issue can enter into the testing, prototype construction, or deployment phase without prior clearance from the USD(A). If such a compliance issue is in doubt, USD(A) approval shall be sought. In consultation with the DOD General Counsel, Office of the Assistant Secretary of Defense for International Security Policy, and the JCS, the USD(A) applies the provisions of the agreements, as appropriate. Military departments and DOD agencies, including SDIO, certify internal compliance quarterly and establish internal procedures and offices to monitor and ensure internal compliance.

Question. DOD has concluded that the first flight test of the Airborne Optical Sensor is consistent with the ABM Treaty. Can you provide details on both the test and your decision on treaty compliance? If the United States discovered that the Soviets had conducted a similar test, would we be able to determine whether a treaty violation has occurred?

Answer. The test program for the Airborne Optical Adjunct has been reviewed by the Compliance Review Group (CRG) and deter-

mined to be fully compliant with the ABM Treaty. While the AOA represents our most sophisticated LWIR sensor to date, it cannot perform the basic radar functions of acquisition and closed loop tracking of an uncooperative target. The target must travel along a programmed trajectory. The experimental device has limited sensor elements, a small instantaneous field of view, slow slewing rates, inadequate sensor range, limited data and sensor processing capability and platform limitations that limit platform altitude and time on station. Furthermore, any change in the performance of AOA or any test involving the AOA's participation in an actual or attempted interception requires additional review by the CRG.

The verification system adopted by the ABM Treaty (Article XII) is based on verification by NTM.

SPEAR EXPERIMENT

Question. Does the Space Power Experiment Aboard Rocket (SPEAR), listed in your testimony, involve nuclear power? If so, what steps will SDIO take to ensure the safety of the launch?

Answer. The Space Rocket Experiment Aboard Rocket does not involve nuclear power.

SPACE-BASED INTERCEPTOR

Question. You state in your testimony that you have increased the performance of the Space-Based Interceptor (SBI) in the planned Phase I system. Can you provide any details on this? Since we haven't tested the "basic SBI," let alone produced or deployed it, how much we increased program risk with this decision to deploy an "advanced SBI?"

Answer. The "advanced SBI" doesn't increase program risk because improvements have been limited to two qualities for which we have large amounts of experience: improved propulsion and increased seeker range. Improved propulsion performance comes from having a bigger fuel tank. Improved seeker range is achieved by opening the sensor earlier in flight. While these improvements don't increase risk, they do increase interceptor weight, i.e., more fuel, more electrical power, more sensor cooling. Those higher weights had to be traded against the decreased numbers of SBI platforms to prove that overall performance could be maintained while decreasing overall costs.

It is true that we haven't tested any SBI but, obviously, there is a lot of experience in missile design and performance. That experience indicates that the highest risk for SBI lies in the guidance and control functions during the terminal homing phase leading to the hit of the target. That was the goal of the SBI ballistic test that had been scheduled for November 1989, but has now been slipped to the future due to budget constraints. In the meantime, tests at the Edwards AFB SBI Flight Test Facility and at the Eglin AFB seeker/guidance hardware-in-the-loop facility will provide data to increase our confidence in the predicted SBI performance.

Question. What percentage of Soviet warheads is the SBI designed to intercept? How will you test the system to determine

whether it can achieve this goal? Will we have these test results before we make a decision on production and deployment?

Answer. The SBI and GBI share the intercept requirements that were established by the Joint Chiefs-of-Staff to provide deterrence against a nuclear attack. In general, as the percentage of Soviet warheads to intercept increases, the number of SBIs required is, however, strongly influenced by the fact that a single SBI can destroy many warheads if it intercepts a booster or post boost vehicle before it releases its warheads. The testing of the SBI performance can be divided into two classes, i.e., (1) the battle management, command, control and communication functions that assign a single interceptor to a single target and (2) the one-on-one interceptor engagement leading to a hit. The first class of testing will be done with the National Test Facility at Falcon Air Force Base. That facility will use data drawn from real sensors and communications subsystems to support simulations of a broad range attack situations. SBI test data will also be used in the National Test Facility. The second class of testing includes (a) the SBI ballistic tests at the White Sands Missile Range and the Kwajalein Missile Range of guidance and control functions for space interceptors, (b) the stability and control tests at the SBI Flight Test Facility at Edwards AFB, and (c) the seeker and guidance hardware-in-the-loop facility at Eglin AFB. In addition, SBI contractors will test subcomponent performance in their laboratories. Literally, thousands of tests are planned over the next few years before a decision is made on production and deployment.

SURVEILLANCE SATELLITES

Question. You have testified before other committees the Phase I system includes sensor and surveillance satellites that can be used, not only for Phase I, but also for future generations of defensive weapons. Yet, I note that you have reduced the overall capabilities of both surveillance satellites. Will this reduced sensing capability mean that any future SDI deployment—a Phase II—could not build on the surveillance satellites of the Phase I system, as originally planned? Will we need to deploy an entirely new generation of surveillance systems?

Answer. Future phases of SDI will be able to build on Phase I elements. The system is designed to be evolutionary, as the DSP program is in an analogous way. For example, follow-on phases may include active sensors on board evolved SSTS satellites, such as laser radar, but the infrared techniques developed in Phase I will be the same, and these evolved satellites will continue to use passive LWIR sensors as well. The individual satellites will simply become more capable and robust, while the Phase I sensors will continue to perform in the SDS until their useful lifetime has ended.

SOVIET COUNTERMEASURES

Question. I understand that you have moved much of the fire control function from the Space-Based Interceptors to the surveillance satellites. This may have been necessary to reduce overall costs, but doesn't this make the system more vulnerable to Soviet

countermeasures, either direct attacks on the surveillance satellites, or interference with communications between the surveillance systems and the interceptor satellites?

Answer. The Strategic Defense System concept is less vulnerable to Soviet countermeasures now that the fire control function has been moved off the Space Based Interceptor (SBI) carrier vehicle (CV). This improvement is the result of (1) the increased redundancy that comes from having the SBI fire control function in a number of elements (BSTS, SSTS, and the Ground Control Center) and (2) the increased distance from the Soviet Union for the new fire control function locations. As low altitude satellites, the Carrier Vehicles were going to have to expend a lot of resources to survive long enough to complete the fire control function. At higher altitudes, the BSTS and SSTS satellites don't have the same problem. By the time the Soviets can bring the same type of attack to bear on the SSTS and BSTS satellites, the SBI fire contol function will be complete for boost phase intercepts. With several different satellites and ground stations involved in fire control, the communications can be accomplished over different, redundant paths. It appears very unlikely that all of the available communications paths can be simultaneously countermeasured. Therefore, the system is less vulnerable to Soviet countermeasures.

Question. Have you analyzed the reduction in the number of surveillance satellites—both the Boost-Surveillance and Tracking asystem (BSTS) and the Space-Surveillance and Tracking System (SSTS)—will increase system vulnerability to "decapitation" attacks?

Answer. The requisite analysis has been accomplished and the reduced constellation of satellites satisfies the missions it has been assigned. While more numbers of satellites are more survivable than less numbers, the current number of satellites is sufficient to survive the threat projected over its lifetime.

Question. You state in your testimony that future generations of directed energy weapons would be needed to supplement the Phase I system in order to deal with possible Soviet countermeasures. Does this mean that Phase I would be negated by Soviet systems that we can predict—today—they may deploy? How much would these cost, and how long would it take for the Soviets to deploy their most likely countermeasure? How effective would they be? What would it cost to counter their countermeasures?

Answer. The SDS architecture is considered to be robust enough to meet JCS requirements even in the face of countermeasures which could be expected. Future concepts for defensive system improvements would be necessary to guard against envolving countermeasures.

[CLERK'S NOTE.—End of questions submitted by Mr. Sabo. Questions submitted by Mr. Conte and the answers thereto follow:]

PHASE ONE SYSTEM COSTS

Question. Conspicuously absent from this list is a heavy lift vehicle of the 100,000 to 300,000 pound class, which only last year was believed to be an absolute necessity for the Space Based Interceptor to be cost effective. What has changed?

Answer. A heavy lift vehicle is still required for follow-on SDS phases. However, it was never absolutely required for Phase One. ALS appeared to offer a cost advantage if built under a national program.

SBI BOOSTER

Question. Launch costs for Phase I are now estimated at $8.6 billion. This includes funds to procure several existing heavy and medium launch vehicles, as well as to develop a new booster specifically for the Space Based Interceptor. This new "SBI booster" would reportedly be sized between the Titan and Delta Classes.

Would you provide details on your plans for this new SBI booster (for example, cost, schedule, and capabilities)?

Answer. SDIO has not finalized the launch architecture for Phase I. As a result of the most recent SDS Defense Acquisition Board Implementer, OSD tasked the Air Force to identify the most cost effective space launch architecture for deploying the Phase I SDS, taking into considertion follow-on SDS phases, and other national security launch requirements. That study is currently underway. In addition to the Air Force, the SDIO, the Navy, and NASA are participating. All existing launch systems proposed modifications to existing systems, and most commercial launch concepts are being examined. Small versions of a modular Advanced Launch System (ALS) are also under consideration. The results of this study are due in the fourth quarter of this fiscal year. If the study determines that a dedicated SBI booster is the most cost effective solution, then cost and schedule information will be available at that time.

[CLERK'S NOTE.—End of questions submitted by Mr. Conte. Questions submitted for the record and the answers thereto follow:]

UPCOMING EXPERIMENTS

Question. General, over the next two years SDI is planning several large space and airborne tests. Your written statement briefly mentions these tests.

What is the total estimated SDI costs for these six experiments? (For the record, break that cost down for each test.)

Answer.

FUNDING DOLLARS IN MILLIONS

Experiment	Prior to 1990	Fiscal Year—			Total thru 1994
		1990	1991	1992–94	
DELTA STAR	138				138
BEAR	112	5			117
LACE/RME	248	20	15		283
STARLAB	434	160	135		729
SPEAR II	16				16
AOA IR	414	43	29	62	547
Total	1,361	228	179	62	1,830

Question. In General Abrahamson's "end of tour report," he wrote the following:

The SDI has provided very real leverage in negotiations with the Soviets. That leverage is about to increase dramatically as SDI research proceeds into many highly visible tests over the next two years, while the program concurrently produces specific and affordable deployment plans.

Does the current state of SDI research truly support the need for these tests now, or are they primarily "highly visible" activities to give us negotiation leverage?

Answer. The research of the SDI program has matured sufficiently that most remaining technical issues relate to integration of the technology elements. In addition, many of these tests are designed to increase our data base in various areas related to rocket plume and earth background signatures. Both of these areas of research are necessary to design the system architecture with confidence. Tests are designed to address these issues and validate the SDS architectures.

STRATEGIC DEFENSE COMMAND PROGRAM MANAGEMENT

Question. General, two recent audits by the Department of Defense Inspector General discovered some serious management problems in two SDI programs run by the Army's Strategic Defense Command in Huntsville, Alabama.

In the Airborne Optical Adjunct (AOA) program, they found a "consistent growth from month to month in the cost estimate to completion, and a consistent understatement (by Boeing) of resulting overruns". This was apparently due to poor cost and schedule control systems of the contractor.

In the High Endoatmospheric Defense Interceptor (HEDI) program, they found that the prime contractor (McDonnell-Douglas) won the contract with an unrealistically low bid and that significant cost overruns were likely. They also stated that "top-level decisionmakers are being shielded from knowing that the HEDI contract will incur significant cost and schedule overruns", that over half a billion dollars will be spent without an approved design for the system, and that the government was overcharged on some expenses. Is this a systematic problem at the U.S. Army Strategic Defense Command?

Answer. Absolutely not. There is no management problem at USASDC. From fiscal year 1985 to present, USASDC has awarded approximately 50 cost to completion contracts for about $2 billion worth of effort. Only five performance measurement contracts have experienced a cost growth situation which has been approved or paid for a total funding increase of 6 percent. Of the five contracts, one was attributed to underestimating, one resulted from adjusted overhead rates, and the remainder were a result of technical difficulties and/or budget cuts. Three other situations occurred where contractors reported an estimated cost growth situation. They were resolved after USASDC investigated the problems and the contracts remained on schedule and within cost.

Question. Generally, you are highly experienced in program management. What do you intend to do to strengthen management controls such as these, to ensure that contractors do not "buy in" on contracts, overcharge the government, and mislead program officials about expected cost and schedule problems?

Answer. After a review of the cost estimating process used, we do not agree that the contractor was permitted to "buy in" and that "top-level decisionmakers are being shielded from knowing that the HEDI contract will incur significant cost and schedule overruns."

In regard to the strengthening of management controls for the contract process, we are developing a Memorandum of Agreement with the Services which clarifies and assigns responsibility, authority and accountability for the management and execution of the SDI program. One key element of this agreement grants the services authority to make resource changes in order to take advantage of their execution experience as long as they do not substantively change the program, milestones, schedule or cost established and agreed upon in the Program Management Agreement. This agreement gives flexibility to the agency managing the program while movement of resources between Program Elements will be coordinated with SDIO to ensure congressional thresholds are not broken. In addition, the agreement provides for the development of directives to further clarify operating relationships in a number of areas including: (1) Program Management Agreements (2) Fiscal policy and financial management (3) Contract administration and review (4) Internal review audit plans.

We continually seek ways to improve our management effectiveness over this important undertaking. As our understanding of the issues has grown, we have refined our management process to more effectively oversee the expansive efforts of our industrial contractors and national laboratories. Toward this end, we recently strengthened our staff by adding an internal analysis capability.

We are also pursuing a pilot program to refine our ability to track in more detail the contract process in order to better measure contractor performance and capability. In August 1988, SDIO selected and adapted a Navy program which has been evaluated by the Navy Inspector General as an "effective management tool worthy of emulation by any project office." In November 1988, SDIO let the CRS contract which will provide detailed reports on funding, logistics and contract administrative actions for Phase I. As this system comes on-line, we will continuously evaluate how it can be used most efficiently to enhance SDIO oversight responsibilities.

ANTI-TACTICAL BALLISTIC MISSILE PROGRAMS

Question. As part of its overall mission, SDI funds a program to defeat tactical ballistic missiles. Included in this effort is the joint U.S.-Israeli development of the Arrow ATBM missile. What countermeasures would have some effect on the Arrow ATBM?

Answer. ———. Threat missile improvements in terms of low radar cross section and harsh environments such as heavy or dense electronic countermeasures would have an effect on the sensors needed to detect, acquire, and track threat missiles. ———.

Question. The Arrow program is only developing ARROW missiles, not a complete radar and weapon system. The committee is advised that a C3 test bed and possibly other very expensive R&D items may be necessary for the Arrow to be deployed. Does SDIO plan to budget for more than the $130 million already agreed to,

and if not, why not? If not SDIO, who will pay for follow-on development?

Answer. The United States-Israeli cooperative Arrow experiment is intended to demonstrate the ability of a missile designed by Israel to intercept a surrogate threat. The experiment fire control functions will be accomplished using range radars in a controlled environment; therefore, it is clear that should a decision be made to develop a complete Arrow System, additional work must be accomplished on the fire control and support sub-systems.

The DOD and the Israeli MOD have recently signed an agreement to develop and Israeli Missile Defense Test Bed to enable the United States and Israel to better evaluate missile defense architectures and the impact that technology and/or doctrine would have on those architectures. This program is not directly linked to the Arrow experiment and possible follow-ons. However, results from such a computer based facility would contribute to the development, defense design and force structure decisions.

No SDIO funds have been budgeted for either the additional work needed to carry the Arrow missile beyond the planned experiment or to develop the sub-systems needed to make it a fully capable defense, e.g. surveillance radars and fire control systems. The allocation of funds to support such a program within the SDIO program would have to be based on a Government of Israel decision to support the development of Arrow as a missile defense system, and a United States commitment to support that decision. Neither the United States nor Israel have made such a decision.

SPACE POWER

Question. According to budget documentation, SDI phase one systems should be able to meet their power requirements through use of solar arrays. Follow-on phases are expected to use space based SP–100 nuclear reactor technology for "base" power and larger, multi-megawatt reactors for "burst mode" power.

The budget states that a project known as SUPER" (Survivable Solar Power Subsystem Demonstrator) will establish the baseline solar power technology necessary for phase one deployment. This would apply primarily to BSTS, SSTS, and SBI satellites. Only $13 million is budgeted for Super through fiscal year 1989, and the program is currently in the earliest of four phases, concept design. However, the budget requests funds to begin full-scale development of the BSTS satellite in fiscal year 1990. Why should these funds be provided when critical space power technologies are at such an early stage?

Answer. SUPER is not currently baselined for BSTS, but could be if threat levels increase and the SUPER technology mature as expected. The baseline power source for BSTS will be hardened solar cells. SUPER, however, is being baselined by the SSTS contractors. The SUPER technologies are based on demonstrated concepts and build on tested SCOPA (Survivable Concentrating Photovoltaic Array) survivability designs. The risks are considered moderate to low to meet the goals of the program.

Two concepts for SUPER will be chosen for further development starting in May 1989. A Critical Design Review will occur in May

1990, to be followed by full scale development, testing, and construction of the SUPER power module. This supports BSTS, currently scheduled to initiate full scale development in fiscal year 1990. Upon completion of SUPER hardware in fiscal year 1992, the module will be space flight tested in fiscal year 1993 to demonstrate confidence in the technology. The space flight could be part of a BSTS demonstration/validation flight.

Question. Concerning the nuclear technologies, a recent National Academy of Sciences report concluded the following:

A. "Estimated masses of SDI space power systems analyzed in existing studies appear unacceptably large to operate major space-based weapons. At these projected masses, the feasibility of space power systems needed for high-power SDI concepts appears impractical from both cost and launch considerations;"

B: "A nuclear reactor power system may prove to be the only viable option for powering the SDI burst mode and for powering the SDI alert mode;"

C. "Power systems appear to be a pacing item for the successful development of SDI directed energy systems and power systems components will be required or SDI power requirements will have to be relaxed." Would you comment on the serious implications of this study?

Answer. A. The current multi-megawatt program is intended to answer the feasibility questions raised by the National Academy of Sciences report. The primary focus in the technology development programs is mass reduction. Significant progress has already been made in developing very lightweight power generation and conditioning components. Programs are in place to achieve the levels which would allow high-power SDI concepts to become practical from both a launch and cost perspective. For example, power levels for NPBs and FELs have decreased significantly to less than 100 megawatts. Programs are in place to reduce power conditioning mass, the dominant system mass, by the end of the nineties by half or more. Thus, instead of a power conditioning mass of 100,000kg, the value is expected to be less than 10,000kg.

B. Recent concept definition studies have shown that the requirements for periodic testing and alert mode operation can be met by modest increases in reactants for non-nuclear multi-megawatt systems, such as fuel cells. For the burst mode, nuclear and non-nuclear options are being evaluated.

C. The current SDIO power programs are structured to provide the major innovations needed in power systems for directed energy systems. Programs in chemical, electro-chemical and nuclear are in place to develop and validate the power burst power system demonstrator concepts for neutral particle beams are currently being evaluated. The selected concepts will provide a demonstration of a space-traceable power system that meets directed energy system needs. The power requirements have tended to become less demanding than anticipated a few years ago; thus, even though requirements are still very stressful, the probability of successfully reaching SDI goals are high. One directed energy candidate, chemical lasers, does not require a large electrical power system.

Question. A recent review of the SP-100 reactor program by the Jet Propulsion Lab concluded that the SP-100 design was signifi-

cantly overweight, lacked survivability features, and because the reactor is being designed in the absence of any mission requirement, the program lacks coherence and is unlikely to produce a useful reactor.

Would you comment on these findings?

How much funding is SDI requesting in fiscal year 1990 for SP-100, and how much has been provided through fiscal year 1989?

Reportedly, the Office of Management and Budget is in favor of putting all SP-100 funding in the Department of Energy's budget. What are the advantages and disadvantages of that approach?

Answer. The current goal of the SP-100 is 4000kg at 100kw. This goal is acceptable for use in a Strategic Defense System. Recent studies by a weight reduction team indicate that this goal can be achieved. Currently, the project is implementing recommendations from the team.

Recent mission oriented studies show that survivability greater than that of hardened photovoltaics (i.e., solar power) can be achieved by SP-100 within acceptable total mass limits.

The present design satisfies NASA and a range of SDIO missions. The SDIO missions evaluated included surveillance, discrimination and weapon platforms. The requirements for SP-100 were written to be generic to encompass all missions. Mission requirements for specific applications reduce system mass as demonstrated in a recent space-based radar study.

In general, the SP-100 program has achieved flexibility in tailoring system features to meet needed survivability characteristics within mass and performance requirements.

The SDIO is requesting $25 million in fiscal year 1990 for SP-100. SDIO has provided $87.5 million through fiscal year 1989.

A single budget submission by DOE incorporating the needs of DOD and NASA in supporting the SP-100 program would permit focused authorization, appropriation and oversight functions by the Congress. The potential disadvantage is how responsive would DOE be to users' requirements. This can be dispelled by increased participation of the user community in direct project management. This increased participation should include the appointment of a SP-100 program manager by the user community who would report to top level DOE officials. This arrangement would parallel the DOE/DOD Naval Reactor Program organization. Steps to this end were also proposed by OMB and are regarded favorably by DOE, NASA and DOD.

HEADQUARTERS MANAGEMENT

Question. The fiscal year 1990 budget requests a 25 percent increase in SDIO headquarters funding. This program element provides for civilian salaries and benefits, rent and utilities, and other program management costs.

General, in 1985 SDIO had approximately 80 headquarters staff. By 1987, even though SDIO funding had been significantly reduced, staffing had risen to 230. How many people are employed by SDIO today, and why has the staff size grown so dramatically when the SDI budget has received modest growth?

Answer. While we have experienced substantial reductions from our budget requests, the program has grown from $1.4 billion in fiscal year 1985, to $3.3 billion in fiscal year 1987, and $3.7 billion in fiscal year 1989. Staffing requirements have also increased over this time period to manage the larger program and evolving research effort. The primary reason for staffing increases is that SDIO was woefully understaffed at program inception and had to rely on personnel "borrowed" from the military Services and Defense Agencies for program management and administrative functions.

The initial 80 manpower spaces provided only the "nucleus" for an organization to manage a program which, at that time, was not fully defined. Once the Director was appointed, he established a program structure and commissioned a study to assess organization and manpower needs. That study, completed in December 1985, led to a validated requirement for 350 manpower spaces (civilian and military). This requirement was confirmed and approved by the Defense Resources Board and is currently reflected in SDIO's approved FYDP staffing level for fiscal year 1990. For fiscal year 1989, SDIO is authorized a total of 263 manpower spaces (civilian and military).

Question. General Abrahamson recommended upon his retirement that SDIO add 60 new staff immediately. Do you plan to implement that recommendation, and if so, why?

Answer. With a current authorization of 263 spaces for fiscal year 1989, we are anticipating an addition +87 space for fiscal year 1990 to bring us to our projected 350 requirement. We have validated and recently reiterated our need for the full authorization of 350 spaces in a memorandum to the Deputy Secretary of Defense on March 29, 1989.

Critical shortages in staff exist in program oversight, programmatically dictated technology insertion, and cost control functions.

Question. A couple of years ago SDIO planned to establish the "SDI Institute", which would be a Federal Contract Research Center dedicated to SDI support and analysis. At the time this was believed to be a high priority for SDI. What is the status of this effort today?

Answer. A portion of the SDI Institute (SDII) function for Phase One of the SDS was assigned to the Phase One Engineering Team (POET). Congressional funding reductions have reduced the overall size of the SDI effort and drastically reduced the range of options and architectures being explored. Therefore, SDIO intends to continue POET for fiscal years 1990, and 1991.

Question. General Abrahamson also commented that the SDIO Director needs more direct control of certain key SDI projects. In his words, "the present system of operating through layers of service headquarters subjects projects to different priorities, procedures, and other bureaucratic problems. This must be corrected and direct control of major projects provided to the Director, SDI." Do you agree, and if so what will you do to cut through this red tape?

Answer. The SDIO Director does need more direct control of certain key SDI projects. There are basically two approaches to gaining more control. One approach is to pull back the management of

these projects to the SDIO headquarters. This would require additional headquarters management resources. In the current environment of a reduced Defense budget, this would be difficult to accomplish. In addition, because the program is still evolving, there would be redundancies with project management in the Military Services.

The other approach, currently being pursued, is to rely more on the Service Acquisition Executives. This requires SDIO to strengthen its ties with the Services and to spell out clearly critical management relationships and policies. A Memorandum of Agreement with the Departments of Army, Navy and Air Froce would go a long way in strengthening the management relationships between SDIO and the Military Services. Currently, one is under development to provide for the effective operation and management of the SDI by streamlining the acquisition management process for SDI programs.

Question. Later in this same document, General Abrahamson states that "it has also been difficult at times to secure the full cooperation of the military services." To the extent that you exercise stronger control of projects from SDIO headquarters (and therefore remove control from service agencies), couldn't we expect less cooperation in the future from the military services?

Answer. To the contrary, as the SDI program matures, SDIO expects increased cooperation and coordination from the military services. Any problems with cooperation over the past years were due to the initial startup of a joint-service program office, which is faced normally with a myriad of operating relationships to define. For the most part, those relationships have been defined now, and we are in the process of formalizing them.

The SDIO is currently developing a Memorandum of Agreement (MOA) with the Departments of Army, Air Force, and Navy to provide for the effective operation and management of the SDI by streamlining the acquisition management chain for SDI programs. Completion of this MOA should strengthen the management relationships between SDIO and the Military Services and minimize further misunderstandings between SDIO and the Military Services.

FALL 1988 DAB REVIEW

Question. SDI is required to undergo an annual review by the Defense Acquisition Board (DAB), which receives formal input from the Defense Science Board, an independent study group. What were the conclusions and recommendations of the DAB in its most recent review, and how did they differ from the findings of the Defense Science Board?

Answer. The DAB met on 2 June and 4 October 1988. Main issues addressed were system life cycle affordability, program executability over the FYDP and compliance of SDI program to SECDEF guidance. The DAB concluded that the SDI program is adequately funded in the FYDP, that significant progress has been made on system affordability and that the program supports development of program elements that would provide the options for a limited protection system as a step along the way to a Phase One

defense which meets the JCS requirements. The conclusions and recommendations of the DAB did not differ from the findings of the Defense Science Board.

PHASE I COSTS

Question. In 1987, SDIO estimated that costs to develop, procure, and deploy the approved phase one architecture would cost as much as $146 billion in fiscal year 1988 dollars. By June 1988, that estimate had declined to $115 billion. The estimate is now $69 billion. Exactly what has caused such dramatic Cost Reductions?

Answer. Currently the GAO is surveying the cost estimates from the DABs in June or 1987 compared with October 1988. In earlier testimony to the House Government Operations Subcommittee on Legislation and National Security, both the GAO and SDIO concluded that most of the cost reductions were due to reduced quantities within certain elements and changes in technical parameters enabled by reallocated functions and reduced redundancy.

Question. In your estimation, how much more could Phase I costs be reduced if the "Brilliant Pebbles" concept was introduced?

Answer. The amount of reduction is not yet known. At this time both SDIO and the Air Force are simultaneously doing in-depth analysis of the "Brilliant Pebbles" concept.

Question. How firm is the current estimate?

Answer. The current estimate of the total cost to demonstrate, validate, develop, produce, and deploy the first phase of an SDS is $69 billion (fiscal year 1988). This figure is a substantial cost reduction from the $115 billion (fiscal year 1988) estimate of June 1988 and we expect even further reduction as architecture refinements and other improvements are made.

We are reviewing alternative architectures and technologies that could result in the cost estimate being substantially reduced from $69 billion. Phase I has just entered the Demonstration and Validation phase; it is at a very early stage in the acquisition process and cost estimates can change. We anticipate bringing the total acquisition cost of Phase I below $69 billion (fiscal year 1988).

BRILLIANT PEBBLES

Question. The concept of the U.S. deploying thousands of space-based missiles to look down on all nations of the globe might seem threatening to some. What would prevent these weapons from being used for offensive purposes?

Answer. Brilliant Pebbles are designed for use only as a defensive ballistic missile interceptor. For instance it has no warhead and requires a direct hit to stop an ICBM or reentry vehicle. Additionally, the Brilliant Pebble would burn up as it enters the atmosphere and cannot be used for striking airborne or ground targets. It would be employed with a positive control that would preclude use for any purpose other than the intended purpose of strategic defense against ballistic missiles. This positive control would be maintained by the man in the loop controlling the system.

Question. Low unit cost is very important to this concept. Yet our space infrastructure has historically focused on mission performance, not low unit costs. How would you go about changing this

culture which has built up in the U.S. space community over several decades?

Answer. Since the current fabrication of satellites discourages the use of modern manufacturing systems, and automation of those fabrication processes, a new strategy to eliminate outdated and costly processes needs to be be developed. A mutually reinforcing program between DOD and industry, such as Total Quality Management (TQM), strives to reduce costs, improve quality and build mutual confidence in new procedures. SDIO will lack market leverage in the industry for several years. In the interim, SDIO is working to identify opportunities for change and cost improvements for on-going systems to develop mutually beneficial investment strategies.

Question. What countermeasures would have some potential effect on the performance of Brilliant Pebbles?

Answer. Brilliant Pebbles is markedly different in design from other SDS elements that have been included in the October 88 DAB Phase I Architecture. It combines several functions in an autonomous unit (command control, sensing, interceptor). Since Brilliant Pebbles is still in the conceptual and design stage, a specified set of countermeasures has not be defined. A study of potential countermeasures against Brilliant Pebbles is expected later this year.

COUNTERMEASURES TO PHASE ONE SYSTEMS

Question. Last year the Committee was given a full briefing on the possible countermeasures to SDI phase one systems. Could you update the Committee on what we have learned during the past year in the countermeasures area?

Answer. A significant amount of information on last year's countermeasures program results is available in the classified "1989 Report to the Congress on the Strategic Defense Initiative", Appendix A, pp. A13–A20. In addition, some recent work that was not completed in time to be included in the report may be of interest. This work is an evaluation of the likelihood of use by the Soviets of a ———.

Question. According to budget documentation, SDIO reduced the fiscal year 1989 budget for countermeasures analysis from $28.6 million to $22.3 million. This cut delayed field tests of potential countermeasures by one year. The ability to overcome countermeasures is critical to SDI's system performance, and this small program could be fully funded within SDIO's discretionary authority. Do you believe such a large cut in this area is wise, and would you re-evaluate 1989 funding to see if additional funding could be allocated to the countermeasures area?

Answer. Unfortuantely, many critical projects within SDI were left underfunded after the annual reduction to the SDI budget request was appropriated. Certainly, the countermeasures work is very important and, like many other projects, should receive a higher level of funding. We will keep this a priority for funding, and, to the extent that other funds are available, will consider it for possible increase.

SPACE BASED LASER

Question. SDIO requests $347 million in fiscal year 1990 to continue research into space-based chemical laser weapons. General, for fiscal year 1989 SDIO reduced its chemical laser program by almost two-thirds, from $261 million to $100 million. How would you convince the Committee that you will be ready to more than triple that effort in the coming year?

Answer. There are two primary assets that affect the ability of the contractor to meet the increased effort for Zenith Star. The facilities must be in place and people with the right skills must be available. The availability of these assets is affected by programs that are ending, by ongoing programs, and by new programs. My program manager has examined the situation at the prime contractor, Martin Marietta, and at the principal subcontractors, Lockheed and TRW, and has determined that the people and facilities are available to meet the increased effort. Further details can be provided.

Question. The "Zenith Star" space-based laser experiment was hit particulary hard in fiscal year 1989, having its budget reduced from $180 million to only $35 million. What are the specific plans, schedules, and funding for this experiment in fiscal year 1990?

Answer. At a $347 million budget for the Chemical Laser program, $258 million would be apportioned to the Zenith Star program. The prime contract, which includes preliminary and detailed design of the spacecraft and the experiments, and subscale design verification experiments, requires $185 million. The balance would be used for designing targets, acquiring launch services, and for support. The estimated launch date at this budget level is October 1994.

At a lower overall allocation for the Chemical Laser program, funds would be apportioned differently. Various options are under study; resolution is expected toward the end of July.

FREE ELECTRON LASER

Question. SDIO requests $275 million to continue the ground-based free electron laser (FEL) program in fiscal year 1990. When will SDIO downselect between the two competing types of lasers for the Technology Integration Experiment?

Answer. The source selection process is currently underway and a decision is expected to be announced by the end of fiscal year 1989.

Question. Are you confident that the physics and engineering of these types of lasers are well enough understood at this point to make such a decision?

Answer. The original plan called for making this decision in fiscal year 1988 and we believed that we had sufficient data at that time to make an informed decision. Budget reductions forced us to delay the decision until fiscal year 1989. In the interim, the research has gone forward with each team making significant strides in both their experimental and modeling work. We now believe that either of the candidates will be capable of performing the mission.

Question. The committee is advised that the ground-based free electron laser might make a useful ASAT weapon. Would you explain what funded activities are underway or planned to enable this laser to have an ASAT capability?

Answer. The ASAT mission is not part of the charter of SDI. Consequently, there are no efforts underway or planned that would add this capability to any SDI system with SDI funds. Until our mission responsibilities are changed to include ASAT we will continue to only work on the SDI application for our systems.

[CLERK'S NOTE.—End of questions submitted for the record.]

Mr. MURTHA. The committee will adjourn until April 4th at 10:00 o'clock.

TUESDAY, MAY 16, 1989.

COMMANDER IN CHIEF, UNITED STATES SPACE COMMAND

WITNESSES

GEN. JOHN L. PIOTROWSKI, COMMANDER IN CHIEF, U.S. SPACE COMMAND

LT. GEN. DONALD J. KUTYNA, COMMANDER IN CHIEF, U.S. AIR FORCE SPACE COMMAND

INTRODUCTION

Mr. MURTHA. Today General John L. Piotrowski, the Commander in Chief of the U.S. Space Command, returns to explain what is being done to correct the chronic management problems associated with the computer upgrades at Cheyenne Mountain. He is accompanied by Lt. General Donald J. Kutyna who is Commander of the Air Force Space Command, which is a component of the unified command.

Gentlemen, welcome to the Committee. Today's hearing will be closed due to the classified nature of the material to be discussed.

From the summary that I have, I can see that a number of things have happened since our last hearing and we appreciate the Air Force's attention to what we considered a major deficiency, but we would like to hear from you. If you would make a statement about what the situation is and then we will put your full statement in the record and get down to questions.

SUMMARY STATEMENT OF GENERAL PIOTROWSKI

General PIOTROWSKI. Yes, sir, Mr. Chairman.

I would like to, as you have asked, very briefly address the communication system segment replacement, or CSSR, and Space Defense Operations Center, SPADOC, issues raised during my earlier appearance on February 9 and give you an update on the progress.

I would also like to introduce General Kutyna, Commander of the Air Force Space Command, which is both an Air Force Major Command and one of my three Component Commands.

GENERAL ACCOUNTING OFFICE REPORTS

To begin with, let me say that the GAO reports are essentially correct, in that both of these programs are over the initial cost projections and are behind schedule. Both the Air Force and the contractors have made mistakes and have had problems throughout the history of the programs. In retrospect, the complexity of these major software developments was underestimated by the contractors and the Air Force, and the initial schedules were unachievable. In essence, the contractors made promises they couldn't keep, and the Air Force believed the contractors could deliver.

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Having said that, let me emphasize that I need both the CSSR and the SPADOC 4 programs. Should the current CSSR completely fail during a crisis, Cheyenne Mountain would be reduced to telephone reporting and manual processing. NORAD's ability to validate, analyze, and assess a missile launch against North America would be slowed significantly, and would put the Nation's retaliatory forces and capability at significant risk. Furthermore, additional delays to CSSR would impact the successful completion of other upgrade programs for Cheyenne Mountain, which are relying on CSSR. I need the SPADOC Blocks 4B and 4C to meet the operational requirements for the space control mission through the year 2005. The longer it is delayed—the higher the risk that the outdated 427M computer system will be saturated by a growing number of space observations. I believe the Air Force now has a firm understanding of the problems that have occurred in both CSSR and SPADOC, and more importantly, that the Air Force and the contractor have an executable plan to complete these programs.

CSSR PROGRAM PROGRESS

Since I met with you in February, progress on the CSSR has been made. The contract for the facility modifications was awarded last month. The fixes to all but one of the twelve open action items reported by the GAO have been defined by the contractor. The solution to the last one has been identified and the fix is ongoing. The baseline for the SSMS message formats was approved on April 5, and I have frozen all requirements so that installation will not be further perturbed. Yesterday the standard survivable message set was on contract for $233,000.

SPADOC 4 PROGRAM PROGRESS

Likewise, progress has been made in the SPADOC 4 program. SPADOC 4A achieved operational status on 25 April, and the Air Force began the critical design review for SPADOC 4B yesterday. At first blush, the contractor appears compliant. If he satisfactorily passes this milestone, we will proceed. If he does not, the Air Force is prepared to terminate the contract. Finally, the Air Force does not intend to award the contract for Block 4C until Block 4B is successfully completed.

Let me say that as the operational commander who stands to benefit from the improved capabilities provided by CSSR and SPADOC 4, and the one whose mission capability will suffer if the programs fail or are cancelled, I am not happy about the delays or cost growth. And I have expressed those concerns to the Air Force.

CONCLUSION

Lastly, Mr. Chairman, let me say that the increased management attention provided these programs in the recent past, should help to ensure that we do not repeat the pitfalls that hampered our efforts to date.

While we are not out of the woods yet, I am confident that there is unanimity of purpose between U.S. Space Command, Air Force Space Command, and the Air Force Systems Command which

should enable us to field these badly needed programs—within current cost—and on the current schedule.

Thank you, Mr. Chairman.

General Kutyna and I will be happy to answer your questions.

[The statement of General Piotrowski follows:]

Testimony

by

General John L. Piotrowski, USAF

Commander in Chief, United States Space Command

Before the

Subcommittee on Defense

of the

House Appropriations Committee

16 May 1989

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House Appropriations Committee

General John L. Piotrowski, USAF

Testimony

to the

Subcommittee on Defense

of the

House Appropriations Committee

Washington, DC

16 May 1989

Mr Chairman, distinguished members, my opening remarks will address two Air Force programs of particular interest to your subcommittee and me, and briefly describe the status and management plan to bring these programs to completion. These programs are the Communications Systems Segment Replacement (CSSR) and the Space Defense Operations Center (SPADOC)--both of which are integral parts of the Cheyenne Mountain upgrade.

Before I comment on specific programs, I'd like to introduce Lt Gen Don Kutyna, Commander of the Air Force Space Command. As commander of an Air Force major command, he reports to the Chief of Staff of the Air Force, General Welch, for organizing, training, equipping, and sustaining issues. General Kutyna is also the system executive manager for the technical integrity of the Integrated Tactical Warning and Attack Assessment System and reports to the Chief of Staff of the Air Force in this capacity.

In his role as commander of my Air Force component command, he reports to me, USCINCSPACE, for peacetime and warfighting operational direction.

As you know, Mr Chairman, the CSSR and SPADOC programs are large computer software programs. Both the Air Force and the contractors have made mistakes and have had problems throughout the history of these programs. In addition, as was predictable, some of the requirements have changed. As a result, the programs are over cost and behind schedule. This--unfortunately--fits the mold of many large computer software development programs.

The CSSR is about $60 million over the initial cost estimate and four years behind the original schedule projection. This includes the $5.0 million to fix the wiring problem, but does not include the cost to implement the new standard protocol after CSSR is operational. The cost analysis for the new protocol is currently under way.

I'm concerned about the cost growth and the delays. I'd like to have it operational now. Fortunately, the impact to my mission has been only marginal so far--due in large part to the ingenuity of Air Force Space Command men and women who find ways to keep the current system operating. However, if the current CSS should completely fail during a crisis, Cheyenne Mountain would be reduced to telephone reporting and manual processing.

Yet another impact of further delays to CSSR would be the effect on other upgrade programs for Cheyenne Mountain which are relying on CSSR. Operationally, I need CSSR.

The GAO report on CSSR is substantially correct--although I don't agree with all of its recommendations. The Air Force should have begun the resolution of the cable congestion and wiring problems in Cheyenne Mountain earlier--would like to have baselined the formats of the standard survivable message sets earlier--and would like to have had the DOD-directed protocol earlier. The contractor, on the other hand, should have done a better job of software development and integration.

Due in part to the GAO report and in part to Air Force initiatives prior to the GAO report, actions have been taken to ensure the CSSR program is under control. For one, I have frozen all operational requirements so that the development and installation are not further perturbed.

The technical control area will be rebuilt. This includes cleaning up the cable congestion problem, fixing the incompatible interface problem and wiring problems, providing some facility modifications, and power upgrades. The clean up of the cable congestion was completed in December 1988, and the contract for facility modifications was awarded on 19 April 1989. High-speed data will be remotely monitored and the initialization time will be solved with a new scheduling scheme. I've sat at the CSSR

console in the development center and personally restored test circuit failures within the required time. The contractor has defined fixes for 11 of the 12 open action items in the GAO report. The high-speed data fix has not yet been finalized, but a probable solution has been identified. The Air Force will retest all 12 open action items in the technical control area during FQT beginning June 1990.

The standard survivable message set--SSMS--will be implemented, although the CSSR is not yet designed for the SSMS. The baseline decision for SSMS formats was finalized 5 April 1989, and Air Force anticipates getting on contract for the software changes within two months.

With regard to the standard protocol requirement, the government decided to delay the implementation of the DOD-directed protocol until after the CSSR is operational. This is the least risk approach. The Air Force's System Integration Office is developing a transition plan for all the Cheyenne Mountain Air Force Base computer systems.

With regard to the message loading issue, we have used the Granite Vista II threat scenario to conduct a loading analysis on the CSSR program. The cost and schedule impacts from this analysis are due this month. This integrated threat scenario--validated by the DIA--will continue to provide a common baseline for analyzing the data loads which CSSR and all Cheyenne Mountain Air Force Base upgrade programs must handle.

In summary, Mr Chairman, I believe the Air Force has a firm understanding of the problems that have occurred in the CSSR program and they have an executable get-well plan to complete this important upgrade.

The SPADOC program is also over cost and behind schedule. The expected costs to complete the entire SPADOC program are upwards of $449 million, about 39 percent increase over the initial cost estimate of 1983. Initial operational capability was declared for Block 4A on 25 April 1989. The schedule for Block 4B calls for completion in February 1991, and Block 4C should be completed in the 1995 time frame, seven to eight years late.

I'm concerned about the delays. I need the SPADOC 4 program to replace the slow manual process extant today. The longer it's delayed--the longer I have to rely on manual space defense operations--and the higher the risk that the outdated 427M computer system will be saturated by a growing number of space observations.

In retrospect, the complexity of the SPADOC task was underestimated by the Air Force and the contractor. Initial schedules were unachievable. The contractor made a promise he couldn't keep, and the Air Force believed the contractor could deliver.

In May 1988, I sent a letter of concern to the commander of Air Force Space Command reconfirming that Block 4B must meet the

quantitative performance requirements, and that the man-machine interface problem and cross-tagging problem had to be fixed prior to being accepted operationally by me.

As a result of this letter, the Air Force Systems Command formed an independent review team in July 1988 to study the SPADOC program and make recommendations. The independent review team found that the requirements for SPADOC could be met by today's computers, that the contractor performance to date had been unsatisfactory, and that schedule slips in Block 4A would increase risk to Block 4B. The team recommended to proceed to the Block 4B critical design review and to make a determination whether or not to continue Block 4B at that time. Shortly thereafter, in the fall of last year, the contractor proposed a new computer hardware architecture for Block 4B consisting of IBM 3090 computers and showed the government that this new computer architecture would do the SPADOC job through Block 4C. The critical design review which began yesterday, 15 May, will assess that proposal.

The GAO report highlighted the problems with this program. Since the GAO audit was completed, the contractor replaced its program manager, the Air Force successfully completed its operational test and evaluation of Block 4A, and Block 4A successfully completed its operational verification period and was declared operational on 25 April 1989.

Progress has been made to get this important program under control, but we're not out of the woods yet. Block 4A is behind us and it's doing its job, so the focus is on Block 4B.

Yesterday, 15 May, the Air Force began the critical design review of Block 4B and the new 3090 architecture. The 3090 architecture should handle the controlled mode security requirement. And it should handle all of the quantitative performance requirements established by the government.

Regarding Block 4C, the requirements definition process is under way. Contract award will not occur until after Block 4B is successfully completed. That is expected to be February 1991. Block 4C is sized to accommodate the growth in requirements through the year 2005.

In summary, Mr Chairman, the SPADOC 4 program has undergone many technical uncertainties, schedule slips, and cost overruns. We have put Block 4A into operational use and it's doing its job. The critical design review for Block 4B is currently in progress and is indeed critical to determine if the new 3090 hardware architecture will do the Block 4B job. And--learning from it's mistakes--the Air Force does not intend to award the contract option for Block 4C until after Block 4B is successfully completed.

With the increased management attention the SPADOC 4 program has received, and the progress which has recently been achieved,

I believe that the Air Force has taken the necessary action to ensure that the later phases of the SPADOC 4 program will avoid the pitfalls that have hampered the effort to date, and that the SPADOC 4 program is still the prudent approach for extending the space control mission into the 21st century.

Mr Chairman, that completes my remarks. General Kutyna and I will be happy to answer any questions.

MANAGEMENT ACCOUNTABILITY

Mr. MURTHA. One of the major problems we saw was command and control. Tell me what the command and control situation is now with the whole Cheyenne Mountain.

General PIOTROWSKI. In terms of these programs and management of these programs?

Mr. MURTHA. Yes.

General PIOTROWSKI. Well, the Air Force has mandated a new organization and stipulated that General Kutyna, as Commander of the Air Force Space Command, is the system executive manager.

It reiterated what had been promulgated earlier.

Mr. MURTHA. I thought the Air Force Chief of Staff, prior to this, was the designated executive agent, but now it is clear that General Kutyna is now in charge of the program; is that right?

General KUTYNA. General Welch has delegated that to me.

Mr. MURTHA. So we have somebody in charge of the program.

General PIOTROWSKI. Yes, sir. Who is in charge of Cheyenne Mountain upgrades has been codified even more clearly than it has been in the past. It was codified by a JCS document in 1981, recodified in 1986 probably as a result of the reorganization, but stipulated in a program management directive in January of this year.

There is no question that General Kutyna is the fellow in charge of Air Force Space Command and Cheyenne Mountain acquisition program.

Mr. MURTHA. I understand that we have gotten tough with the contractors. We understand that you have started to get these contractors under control, because the information we had was that they were running loose out there; there was nobody in control.

What have you done to get that situation under control?

General KUTYNA. We have established a program management structure which extends from me to a system program director at Boston at the Electronic Systems Division, Jim Jacoby, and under him our program managers. I talk to Jim Jacoby once a week. From the top end, I have gone individually to the contractors and told them they are in trouble. I have leverage with those contractors because we have many, many other contracts they are competing for. I have gone to their bosses and told them the importance of these programs to us and I have gotten their attention. I have seen a change in management in Colorado Springs and a better span of attention with GTE and other contractors. So I think that chain of management is showing some results.

INTEGRATION OF ACQUISITIONS

Mr. MURTHA. Have you gotten the technical issues under control?

General KUTYNA. Not entirely, but we are working on them. We have a resolution plan to get these issues under control.

Mr. MURTHA. Well, the central issue in our view is whether the Air Force can continue patching the five separate acquisitions in the billion dollar program, and whether you are able to get the contractors under control and put this thing together so we have a viable operation out there?

General KUTYNA. Yes, sir.

We have put four of the five programs together under one program manager.

The other one we manage ourselves, right under me at Space Command, so we have not put that under, although the ties are very close. I have instituted orderly program reviews from the three star level to make sure that we know what is going on.

Mr. MURTHA. I appreciate what has happened since we met with General Piotrowski last time. I talked to Admiral Crowe about how unhappy we were with the program and the fact that we didn't feel there was responsive leadership and control of it, and we appreciate the attention that has been paid to this program.

Everybody spoke very highly of you, General Piotrowski, when I talked to them.

We were disappointed that this program was not under control, and I see that we are moving in that direction now, and we look forward to some progress and I am glad to hear that these contractors—one contract in particular where they had such a big overrun, will not be awarded because that was, in my mind, poor management on the part of the Air Force.

Mr. Livingston.

MEMBER REVIEW OF THE PROGRAM

Mr. LIVINGSTON. Thank you, Mr. Chairman.

I had the pleasure of going out to Cheyenne Mountain about a month or so ago and General Piotrowski and General Kutyna were nice enough to show me around and give me an idea of the problems of CSSR and SPADOC. I immediately wrote a memo following my trip, which the staff has.

I would like to submit that for the Committee's files, Mr. Chairman.

Mr. MURTHA. Without objection.

Mr. LIVINGSTON. I think it would be helpful, Mr. Chairman, if it is made part of our Committee files.

Basically, gentlemen, my conclusions were that both programs ran into problems primarily because we are trying to bring on new technology to an on-line system that is operational and frankly within a limited space, and that that proved more difficult than we had originally anticipated, particularly because when we started the renovation, the technology wasn't developed yet.

CSSR, while exceedingly complex in hardware and software, seems to be pretty well on line. Would you quarrel with that?

General PIOTROWSKI. I think that is a good assessment, Congressman Livingston.

In fact, at about the time you were there, they were just going through a validation, not a full formal qualification, but essentially a validation of equipment performance, which they passed successfully and demonstrated successfully.

SPACE DEFENSE OPERATIONS CENTER (SPADOC)

Mr. LIVINGSTON. And SPADOC is a different problem and you say you have an evaluation going on at this point?

General PIOTROWSKI. That has been completed, sir, and——

General KUTYNA. If I might interrupt, it was started yesterday.

General PIOTROWSKI. I don't know if you are talking about the operational verification being conducted while you were there or the critical design review.

Mr. LIVINGSTON. Separate them.

General PIOTROWSKI. The operational verification of the SPADOC 4A was completed and I talked to the operators personally and asked them for their vote on whether the system was ready to be made operational. The Navy Commander, a former astronaut, Dale Gardner, who I believe you met, looked me right in the eye and said, "General, this gives us a tremendous capability we don't have today." Based on their assessment, it was declared operational on 25 April. So that initial block, which gives us the automatic capability, is operational today. I will ask General Kutyna to talk about the critical design review.

General KUTYNA. The critical design review for SPADOC 4B started yesterday and it will continue for five days. Afterwards, the SPADOC 4B contractor will have 60 to 90 days to resolve action items. They had the executive review yesterday for several hours and initial reports are that it was an excellent review. The bottom line is that they appear to have met the requirements for SPADOC 4B at the system level. There are still some problems yet to be resolved, such as how to transition into Cheyenne Mountain—it is like trying to overhaul a carrier steaming in combat—but the basic objectives appear to have been met.

We will know more in 60 to 90 days.

Mr. LIVINGSTON. Let's talk in terms of contractors and principal subs. On CSSR, the prime contractor is GTE. Do you both feel comfortable that they are fully capable of fulfilling the mission as it is now programmed?

General PIOTROWSKI. From what I can see of their performance and their willingness to correct the 12 critical deficiencies that existed earlier, I believe that the Air Force has their attention and that they realize that they have to perform and it appears they are.

General KUTYNA. They have been very responsive and we just had a negotiation this week, last Friday we settled on a very important point. They are performing much better than they have in the past.

Mr. LIVINGSTON. You are satisfied that if that type of cooperation and attention is provided the program, that we will fulfill the specifications without delay?

General KUTYNA. Yes, sir.

General PIOTROWSKI. I agree.

Mr. LIVINGSTON. On SPADOC, the prime contractor is Ford.

General PIOTROWSKI. Yes, sir.

Mr. LIVINGSTON. The subcontractor on a lot of the software was TRW?

General PIOTROWSKI. That is correct, however they were terminated by Ford for lack of performance.

Mr. LIVINGSTON. TRW is no longer in the picture?

General PIOTROWSKI. Yes, sir.

Mr. LIVINGSTON. So that is a fait accompli.

What is the standing of Ford's handling of the program and what do you project for their ability to fulfill the mission?

General PIOTROWSKI. It certainly appears we got their attention. The President of Ford Motor Company has been out to talk specifically with myself and General Kutyna about the program and our view of the current management. I have had a number of conversations with Jack Thornell, who is the on-scene Vice President of Ford Aerospace. They appear to be very responsive. General Kutyna may have more specifics on Ford Aerospace performance, Congressman Livingston.

General KUTYNA. Extremely responsive on fixing those things that we point out to be fixed. I talk to the manager on a weekly basis and the vice president on a monthly basis.

Mr. LIVINGSTON. The key problems in this program are software?

General KUTYNA. Yes, sir.

Mr. LIVINGSTON. Are we technologically capable of fulfilling the mission that has been designed here?

General KUTYNA. I think a major software program is always going to be difficult. I don't know a single one that has come in exactly the way we thought it would, whether developed by IBM or Boeing or TRW or Hughes. They have all had problems with software at one time or another. I think they learn from their mistakes if they put the right people on the project.

Ford did not put their best people on this project. They have gotten rid of TRW—so I think we will have these things in hand, but there will be problems that pop up.

At first, we tried to integrate it all at once, develop all these separate pieces and bring them together at the end. It is like throwing a bunch of ingredients in a stew; you don't know what it will come out like. Now we are taking a bite at a time, integrating the software as each piece is developed. SPADOC 4B has eleven distinct integrated baseline versions each providing increasing system capabilities to make this thing come together better.

Mr. LIVINGSTON. Based on their new-found attention to the importance of the program, do you have reason to believe that Ford will not be able to perform under the specifications of the contract?

General KUTYNA. I think they will largely meet the specifications.

Mr. LIVINGSTON. How much delay are we looking at on both programs?

General KUTYNA. Delays from the original dates, Block A was supposed to be in 1985. It just came in April of this year. Block B was supposed to be complete the first quarter of 1987. It will not be done until 1991. We will let the contract for Block C in 1991 and it is projected to be completed in 1995. So it has slipped to 1995.

Mr. LIVINGSTON. This is SPADOC?

General KUTYNA. Yes.

General PIOTROWSKI. If I could add one comment.

As General Kutyna discussed earlier, the critical design review has just started and at first blush the contractor looks very compliant and it looks like the performance of the system will be well within the performance specs that we have asked for, including those that were rolled over from Block A. However, until the Critical Design is completed, it would be difficult for us to say that we have confidence that Ford will be able to perform. Right now, it looks hopeful.

Mr. LIVINGSTON. You are going to have ongoing evaluation——
General PIOTROWSKI. Yes, sir.
Mr. LIVINGSTON. You are going to have that evaluation in the way of steps?
General PIOTROWSKI. Yes, sir, but if he does not demonstrate that capability and compliance in the CDR, then the Air Force is prepared not to go forward as it should not.
Mr. LIVINGSTON. At any point until completion?
General PIOTROWSKI. Yes.

COMMUNICATIONS SEGMENT SYSTEM-REPLACEMENT (CSS-R)

With regard to the CSSR, it will not really take place until April of 1991. The tech control, Block I, has been completed. You saw it sitting in the training facility. It is one of two sets, the other is at the contractor's facility for use in developing Block II equipment. Ten thousand feet of the cable under the floor in Cheyenne Mountain you saw has been removed. The facility contract, I believe, has been signed and that work will go forward. The engineering team that is there to do the rest of the wire removal and correction will work in concert with the facility upgrade; in other words, the facility modification will go forward. The wiring problems will be corrected, and IOC is scheduled for April of 1991. That is essentially a four-year delay on Block II.

CABLE CONGESTION

Mr. LIVINGSTON. You mentioned the cable that has been removed, and certainly that was probably the most visibly demonstrable mess I have ever seen. You are talking about within the Cheyenne Mountain, all these miles and miles of cable worked up like spaghetti under the floor which you were replacing with fiber-optics and other types of modern technology, whatever it may be.

My question is that I have been told that the institution, the bureaucracy, be it Air Force or contractor or whatever, is used to using the old system, and that many folks within the institution are just absolutely reluctant to change, even resistant to change, and that some of the causes for delays have been that the institution has refused to recognize the new technology because they are comfortable with the old. Is that true and to what extent has that played a role in your problems?

General PIOTROWSKI. Well, sir, I have to believe that there are some people out there that are comfortable with the existing systems and understand the software and the switches and so on and so forth, and perhaps feel threatened by newer technology. However, the leadership down through the ranks of majors and senior NCOs clearly are all looking forward to the new technology. Those that have had a chance to touch it, for example, the Air Defense Operations Center, which is the first operational Granite Sentry Center.

Their operators are very excited about the increased performance and operator friendliness the new systems offer. It gives them capabilities that they never dreamed that they could have before. So those that have had an opportunity to see and touch the new capability are very excited about it and the leadership is certainly in support of it. Incidentally, the Air Defense Center Granite

Sentry upgrade came on line in February, two months late out of a two-year program, but basically on cost.

Mr. LIVINGSTON. Do you think you can overcome the institutional resistance at the lower levels?

General PIOTROWSKI. You bet, sir.

Mr. LIVINGSTON. General Kutyna?

General KUTYNA. We will overcome it; yes, sir.

Mr. LIVINGSTON. Thank you. I wish you well. I appreciate your hospitality.

Mr. MURTHA. We appreciate you taking as much time to see the operation as you did.

Mr. Sabo.

SOFTWARE MANAGEMENT

Mr. SABO. Thank you, Mr. Chairman. General Piotrowski and General Kutyha, welcome.

I haven't followed this problem that closely so I don't have a particular question, but I am just curious, within DOD, what kind of apparatus is there to make judgments on software? You know, if somebody tells us they are having problems with construction or with hardware, we know how to deal with them. Software problems are more difficult, but it seems like every system has software problems. It just permeates the system. The reality is that today software is much more of a problem than hardware, and it seems to be much more difficult to handle.

What kind of institutional intention is there to resolving major software problems? Do we have any system in place?

General PIOTROWSKI. I would start off by saying, Congressman Sabo, that your observations are entirely correct; that it appears that we don't have the measurements with which to grapple with software. When somebody says we need some algorithms to be able to have a radar detect something, report on it, et cetera; contractors come in and say, "We can write that software package for 800,000 lines of code plus or minus 10 percent," and demonstrate some piece of that software code that they have already written. We don't have good tools today, that I am aware of, to calibrate that and say, "No, it is going to take 1.4 million lines of code." There is not a major software program that I am aware of that is not in some sort of difficulty. In almost every new software program or major upgrade the contractor or the Air Force, or the other Services have underestimated the difficulty and the computer power to make it work within the time lines; for example perform this function in so many milliseconds or seconds. I think we are getting smarter on that. We are learning how to measure the performance of contractors as they write software, but it is not an exact science. It is a black art.

Maybe General Kutyna would like to add more to that. He has had more experience in this regard than I have.

Mr. SABO. We have thousands of people who are working in minutia on hardware procurement. Is there any centralized look at the problem of software? where do you go for assistance?

I could make no judgments on software. I suspect most of us couldn't. It seems to me it is much more difficult to find people to make judgments on it than hardware.

General PIOTROWSKI. The OSD certainly has expertise in the command and control area under Mr. Gordon Smith, formerly Mr. Don Latham. The Air Force has resident experts on software. In fact, they have a senior executive course now called Bold Stroke which is designed to try and make us all more computer literate. I think the problem probably stems from our inability to produce software architectural engineers. We have got a lot of people that can write software, but the art required to formulate an entire architecture within which individual lines of code will be written is in very, very short supply in this country.

Mr. MURTHA. If the gentleman would yield, is it even more basic than that? Is there a possibility some of these problems cannot be solved, and we are expecting too much of software solutions?

General PIOTROWSKI. I believe, Mr. Chairman, that that is a fairly correct statement if you want to bound it by saying, "this problem cannot be solved on that machine within the dollars—and when I speak of time, not only schedule time, but within performance time."

Mr. MURTHA. For instance, you take specifically Cheyenne Mountain where you have so many different complex systems. I still believe there was terrible management of that whole thing.

But still we have technical problems which we haven't overcome, which we thought we could overcome when we started out. I think Mr. Sabo's point is valid. We have a responsibility to oversee and obviously we don't have the expertise to know exactly what can be specifically done so when somebody presents a problem to us and says this could be solved, it sounds logical. Do we have a way of measuring this before we get into the program when it costs so much money to finally overcome the problem?

I think that is the bottom line; can these problems be solved, and how can we know before we get into them the cost of solving these problems?

For example on these programs, you are eight years behind, is there even one system now that is working out there?

One is operational out of the five; is that right?

General PIOTROWSKI. Actually, two portions of five, total. Sir, the answer to that should be yes and a great deal of money and effort is spent in trying to make that answer yes. We fall short of the mark, embarrassingly so. For example, I think the Air Force is paying Mitre Corporation something like $60 million to advise them on the CSSR program and to evaluate contractor proposals. There are a number of contractors that were paid for their advice: Is this doable? Is this technical approach a valid approach, and so on and so forth? In some cases, I am sure Mitre advised that we needed to do some things differently and perhaps we didn't listen to all of their advice. Competition, of course, is another factor. There are independent cost assessments where it is determined whether or not the job can be done and done for the dollars available to the Air Force or proposed by the contractor.

So when you look at all the checks and balances that do go into a procurement acquisition today, one would like to believe that the answer to your statement is yes, we can.

History would show that we often fall short of the mark.

General KUTYNA. My experience, I had 40 programs when I was in Boston under me, and the only ones that had problems were those with software. The AWACS, inertial upper stage, Cheyenne Mountain—all had software problems. After we initiate a software development program, we come back five years later and say, "Here it is," and the users say, "That is not what we asked for. That is not correct." In the programs in which we are having successes, we are taking small bite-sized pieces. In this one program to modernize command centers, Granite Sentry, we brought it to Colorado Springs and on a daily/weekly basis, the user comes down and looks at what software we have written and sees if he likes it. We have had success with that program. It is not perfect, but it may be the solution to do these gigantic software programs in the future.

General PIOTROWSKI. The other advantage is each of the important things like missile warning, space defense, space surveillance are all individual blocks of software that can be updated in small packages without contaminating the entire system.

Hopefully, we are moving in a direction that will allow us in the future when we come forward on programs that we can talk about a small program that is being done independently and in isolation of others, but still integrated into the entire package and we are getting smarter on integration.

Mr. SABO. How do you make any judgment in the bidding process? I would assume development of software is a big ticket item in any system.

General PIOTROWSKI. Let me give you my overall view of the process. First, when we come up with a program internally, our engineers determine roughly what that program will be in terms of size and cost. Then we go out and hire a corporation like ANSER or Mitre or Aerospace Corporation to give us their assessment of the program, so we get an outside, independent vote, which we pay for. Then we go into competition, request for proposals are published. Different contractors make different analyses of the problem and how to solve it. Then we sit down and talk to those contractors in the contracting process. Service experts evaluate why each bidding company thinks they can do it for this price and with this many man-hours and with this solution.

In the final analysis, we tend to believe that the contractor we pick has made a reasonable approach for an acceptable and affordable price based on all of our internal analysis and all the advice we have been given. The rule of thumb is almost double the cost and triple the time from that process. I mean, if you look at history we just don't have the tools that we can look at—you know when you are building an aircraft, you can almost say if it is a 30,000-pound aircraft it will cost this much. You can weigh avionics and say if they are going to be about this heavy, they are going to cost that much. With software, we can essentially price it by lines of code, but we don't have any way of calibrating how many lines of code it is really going to take to do the job and how complex they are. You know, sir, I am frustrated as you are, because I have sat

at those deliberations and looked at it and just shaken my head. The tools just aren't there.

Mr. SABO. That is all I have. Thank you, Mr. Chairman.

Mr. MURTHA. Well, we appreciate the improvement that has been made. We will send a letter to Mr. Atwood asking him to review this program closely, and we know it is a complicated thing. We had been disappointed with the way it was working, but we appreciate the substantial improvements that you have made and we will monitor it closely.

Unless Mr. McDade has any questions, we will——

Mr. MCDADE. Mr. Chairman, how long have you been questioning the witness? We are glad to see you back, General. I am sure that we have had a good hearing. In fact, as I walked in, some of the staff nodded to me, so we are glad to have you back. We look forward to working with you.

General PIOTROWSKI. I apologize that I wasn't very prepared to answer your questions the last time, but we have done a lot of homework. I think it is fair to say that the committee's interest has certainly got our interest.

Mr. MCDADE. Thank you, Mr. Chairman.

Mr. MURTHA. Mr. Livingston?

Mr. LIVINGSTON. Thank you.

Mr. Chairman, I have looked through the questions prepared by staff and they are extensive and detailed. I think it would be good for us to complete the record to propound those questions and get them answered.

Mr. MURTHA. Mr. Young has some questions for you to answer and we have a number of questions for the record. We would like you to answer them.

General PIOTROWSKI. We will be happy to.

Mr. MURTHA. Thank you very much.

The committee will adjourn until 1:30 p.m. today.

[CLERK'S NOTE.—Questions submitted by Mr. Young and the answers thereto follow:]

POWER FOR SPACE PLATFORMS

Question. General Kutyna, it is my understanding that demands for electrical power for space platforms are growing, both in terms of increased power and greater survivability. I understand further that most of the power requirements are in the range of 5 to 40 kilowatts for surveillance and communications satellites, and that this is a power range where survivable solar power systems are probably prohibitively large and heavy. Would you comment on the desirability of having a small, survivable nuclear power option for future space systems?

Answer. I believe that such a system is absolutely necessary for future space systems as our power requirements increase across the board. Both Air Force Systems Command and the Strategic Defense Initiative Organization are currently involved in research to develop these survivable nuclear systems in the several hundred kilowatts to several megawatts range for applications in both force enhancement missions as well as strategic defense. It appears at this time that a survivable, nuclear system should be available to

us in the next ten years providing the current level of research funding continues.

[CLERK'S NOTE.—End of questions submitted by Mr. Young. Questions submitted for the record and the answers thereto follow:]

THE SITUATION IN THE EARLY 1980'S

Question. The following are excerpts from the House Committee on Government Operations report in March, 1982:

"Beginning in October of 1979, a series of computer failures occurred at the North American Aerospace Defense Command's (NORAD) missile warning center at Cheyenne Mountain, Colorado. These highly publicized failures led to our Nation's strategic forces being placed unnecessarily on alert and caused many to question the credibility of our country's premier missile warning and attack center."

"Further, it was found that the NORAD facility had been mismanaged over the last decade by the Air Force, the Joint Chiefs of Staff, and the Department of Defense, resulting in obsolete computer systems which do not satisfy the requirements of NORAD's sensitive mission. These obsolete systems, coupled with poor management practices and human error, were directly responsible for the false alerts."

"The underlying cause of the obsolete systems was the failure to complete a computer modernization program initiated by the Air Force in 1966. By May of 1981, it was more than 6 years behind schedule and about $150 million over budget. More importantly, the system only has, at best, an information processing capability of the 1966 system it replaces."

"The repeated failure of these projects are caused by poor planning, fragmented management, and a lack of accountability and leadership."

"Strong central management and oversight are urgently needed . . ."

Please review the reasons for the situation that occurred in the early 1980's.

Answer. At that time, two incidents occurred in Cheyenne Mountain that gave false indications of a missile attack. The first incident on November 9, 1979 was a personnel error which occurred when an exercise test scenario tape was mistakenly inserted into the operational computer system. The second false event occurred on June 3, 1980 when false attack indications were caused by a faulty computer chip.

To reduce the possibility of any further personnel errors, "flag officers" (generals and admirals) are now serving as the Command Directors, and structured regulations requiring additional human intervention to verify data have been implemented. Additionally, we established an offsite test facility so that we could do our hardware and software testing in isolation from the operational system.

To correct the chip malfunction, that chip plus all other critical chips were replaced and the circuit boards were redesigned. Software has been developed to provide more check fields in the message and a data monitor has been installed along with a recorder to provide visual and hardcopy records of message validity. Our

analysis indicated that these actions would reduce the probability of a hardware fault generating a false missile warning message by a factor of 10–23.

Question. Approximately how much did it cost the government to install the upgraded computer system which ultimately failed?

Answer. The 427M program cost at completion in 1979 was $220 million ("then-year" dollars).

Question. How did we get into the posture of installing a new computer system which was no more capable than what it replaced?

Answer. The successful development of any system depends on well organized and disciplined management of resources. There were eight contractors and four Air Force control offices involved at one point in time during the 427M acquisition. This fragmented management structure prohibited a coherent approach to system development. Additionally, the JCS directed NORAD and ADCOM, despite strong objections, to use WWMCCS hardware and software. The WWMCCS Honeywell computer was designed for business applications and while suitable for other command centers in the JCS network, it proved to be inadequate for NORAD and ADCOM processing needs. The limitation drove a higher level of complexity in the software as efforts were made to overcome the hardware limitations. In the late 1970's, it was projected that 427M would be ready for IOC; however, during final testing in Cheyenne Mountain several requirements could not be met. Because of limited logistical support of the operational system and the potential growth of the new system after it was installed (compared with current system), it was decided to bring 427M on-line even if it was judged as no more capable than the system it replaced, at that point in time.

Question. Did the system ever achieve "full operational capability"?

Answer. The system never fully met the requirements that were originally envisioned. The system only achieved an "Equivalent Operation Capability" because it could do no better than the system it replaced.

ROLE OF THE CINC

Question. The House Government Operations Committee stated in its 1982 report that it was "encouraged by the decision of the Secretary of Defense to restore the Commander of NORAD's position to that of a full general." Is it true that the main reason your billet now requires a four star general is because of the Cheyenne Mountain crisis in the early 1980's and the Department's commitment to fix it?

Answer. The CINCNORAD billet was, in fact, downgraded from a four star to a three-star general billet from January 1980 to October 1981. It is my understanding that the position was eventually restored to that of a four star general because the United States and Canada decided the CINC responsible for aerospace defense of North America should be equivalent in rank to the CINCs of the Unified and Specified Commands, who are all four-star generals and admirals.

Question. What exactly is your role in the management of the Cheyenne Mountain computer upgrades today? What do you do? What don't you do?

Answer. USCINCSPACE/CINCNORAD delineates operational requirements which the Cheyenne Mountain computer upgrades must meet, and approves or disapproves any changes requested to these baseline operational requirements. In addition, US Space Command representatives attend design reviews and recommend changes, as appropriate, to help ensure operational requirements are met. Following delivery by the Air Force, USCINCSPACE/CINCNORAD must verify the upgrade programs meet stated requirements prior to their final acceptance.

The Air Force has developed a TW/AA System Executive Management structure responsible for managing and maintaining the integrity of the TW/AA system. The Commander of Air Force Space Command is the System Executive Manager for all TW/AA elements. He is responsible for overseeing Air Force Systems Command management and integration of upgrade programs, for keeping USCINCSPACE informed concerning their progress, for helping resolve problems in the development and integration of these systems, and for ensuring system integrity is not compromised.

Question. Who are the other key players and what are their roles?

Answer. Air Force System Executive Agent for TW/AA (Commander, Air Force Space Command): The System Executive Manager is responsible for overseeing Air Force Systems Command management and integration of upgrade programs, for keeping USCINCSPACE/CINCNORAD informed concerning their progress for helping resolve problems in the development and integration of these systems, and for ensuring system integrity is not compromised.

Air Force Systems Command/Electronic Systems Division (ESD): Serves as the program manager for the Cheyenne Mountain upgrade programs. Responsible for managing cost, schedule and engineering of contractual efforts.

Question. Is the success of this program ultimately your responsibility?

Answer. My responsibility is to identify operational requirements and verify that the systems provided do in fact meet those requirements. The responsibility for providing the required systems belongs to the Air Force. If a new system or an upgrade does not meet stated requirements, I would refuse to accept it until deficiencies were resolved by the Air Force.

In his single-manager role as the Air Force's System Executive Manager for Integrated TW/AA, the Commander of Air Force Space Command is responsible for the overall execution of the efforts to meet those requirements.

Clearly getting to the end goal—a successful program that provides the needed mission capability—requires a strong joint effort.

Question. When the U.S. Space Command was established in 1985, and the Air Force Space Command became a subordinate, how did your responsibility change?

Answer. When U.S. Space Command was established, the CINC initially had to perform not only the traditional unified command

functions of wartime planning and mission-execution, but also the organizing, training, and equipping of the USAF forces assigned to USSPACECOM. USCINCSPACE was dual-hatted as both CINC and MAJCOM commander—that is, he was his own component commander. The unwielding nature of that arrangement soon became apparent, and after about a year, the two roles were separated which allowed the CINC to concentrate on his operational mission—and at the same time, he was executing his responsibilities for North American Aerospace Defense as CINCNORAD.

Question. We hear that you often get involved in the nitty-gritty details such as colors to be used on computer screens and formats of the displays. How much "hands-on" involvement do you have in these programs? Wouldn't it be better for you to focus on the acquisition and planning issues which cry out for attention, and are much more vitally important?

Answer. In most areas of these developments my staff and I stay well out of the nitty-gritty details of how the Air Force is meeting my requirements. Our primary focus is on the identification of requirements.

However, there is one aspect that is different. As the Commander in Chief of North American Aerospace Defense Command, I am personally responsible to the national authorities of the US and Canada for the timely assessment of attack on North America and the warning of our forces. It is vital that information required for me, or my designated representative, to make this assessment is properly displayed. In "human-engineering" NORAD command post displays, Air Force developers have asked me and my staff to review and evaluate their suitability. While it is a "nitty gritty" activity, good displays are essential to effective decisions so it is well worth my attention.

THE ORIGINAL "GET-WELL" PLAN

Question. The Air Force Chief of Staff's "Special Management Review of USAF Support to the Tactical Warning/ Tactical Assessment System" reported the following September, 1980:

"The principal finding of the review is the Tactical Warning/ Attack Assessment elements are not recognized or managed by the USAF as a complete system. This condition results in:

"Divided approaches on how elements are acquired, interfaced, and managed.

"A lack of end-to-end direction for operations concepts, doctrine, and procedures.

"There is no single agency or command responsible for acquiring TW/AA subsystems.

"Long range planning in support ot the TW/AA system is deficient."

What was the original plan to fix the problems at Cheyenne Mountain? Why didn't it work?

Answer. Broadly speaking, the original plan to fix the problems at Cheyenne Mountain (1980–81) was to implement the recommendations set forth in the Special Management Review of USAF Support to the TW/AA System, 3 July–2 September 1980. The principal finding of the Special Management Review, also known as the

Leaf Report, was the "Tactical Warning/Attack Assessment elements are not recognized or managed by the USAF as a complete system." To remedy that situation, the CSAF directed implementation of the report's recommendation in an 8 October 1980 letter. USAF Program Management Directive (PMD) 1044, 19 March 1981, and JCS SM-568-81, 17 August 1981, were the major vehicles detailing and tasking the specific actions.

The plan's initiatives fell into three major categories: management, technical, and procedural. We developed a TW/AA System Executive Management structure to recognize and manage the TW/AA as a system while keeping in mind the mission and requirements of the operations and acquisition commands. The structure consists of the Executive Agent, CSAF; his System Executive Manager, then Commander ADCOM and now Commander AFSPACECOM; the System Integration Office (SIO); the General Officer Review Group (GORG); and the Subsystem Executive Managers (SSEM). AFSC established a single focal point for managing the acquisition process for the TW/AA System. A configuration control system was also implemented.

To solve the technical aspects of the problem, we acquired redundant communication capabilities and developed a missile warning by-pass to ensure critical warning messages could not be lost because of failure of the Communication System Segment (CSS) in the mountain. The computer systems received hardware upgrades. We developed and implemented software standards and perhaps, most importantly, we established an off-site test facility to minimize risk during software development and testing.

Operational and procedural approaches were reworked too. We implemented rigid test control safeguards. A general officer, fully qualified as command director, is on site for all significant on-line testing. Detailed coordination is now required for all on-line tests and two-man control of test media is required. Voice confirmation is required for all event processing within the system. Finally, we improved training curricula and developed off-site training facilities for command post and warning system operations.

We have been successful in all of these areas.

Question. What is the "single agency or command" today which is responsible for acquiring Cheyenne Mountain subsystems?

Answer. In the context of my previous answer, General Kutyna, as the Commander of Air Force Space Command is the System Executive Manager—not just for the Cheyenne Mountain subsystems but for all of the TW/AA elements. Rather than putting all implementation within a single command or agency we have established a single manager to oversee the responsibilities of the various subsystem implementers.

Question. Do you manage Tactical Warning/Attack Assessment elements today as a "complete system"?

Answer. Yes, from sensors to CMAFB and out to the forward users. The System Executive Management structure that I've described has that "complete system" focus and authority.

Question. Last year the Committee directed the Air Force to combine the many funding lines associated with Cheyenne Mountain computer upgrades into a single program. If you manage them as a

"complete system", why did we have to direct you to budget for them as a complete system?

Answer. We have managed these funding lines as a "complete system" for some time now. When budget shortfalls caused us to restructure the programs and schedules in 1987 we looked at overall priorities in all the upgrade efforts and re-allocated the available budget as needed. Although each of the CINC upgrade programs contributes to the "whole" of our TW/AA capability, each one was conceived, designed, and funded as a separate piece—thus, there was a separate funding line for each. That did not mean they were not integrated as a complete system; that was done by the SEM and SIO. It was not thought necessary to combine funding; however, we agree with the committee directed initiative to move these funding lines into a single program element—it will give us greater management flexibility as well as giving you easier visibility into our total system program.

Question. Wouldn't you agree that the problems we are seeing today in the Cheyenne Mountain upgrades—mainly fragmentation and lack of accountability—are identical to those nine years ago?

Answer. No. Today's problems are different. We have come a long way from the fragmentation and accountability problems of nine years ago. Our problems today are a result of underestimation, both by the Air Force and the contractors, of the complexity of these major software developments. Though assessed as "feasible" by both DoD and contractor experts, we now know our initial schedules were unachievable. It is true that our fixes to these technical problems have involved complete trade-offs, but we have the management structure in place to allow us to make those trade-offs. We didn't have that nine years ago.

Question. The Defense Department currently has a $1.3 billion Modernization program to again completely replace the computers in Cheyenne Mountain. Please describe each of the current individual Cheyenne Mountain computer upgrade programs, what they do, and how they relate to each other.

Answer. Cheyenne Mountain Upgrades include five programs: Survivable Communications Integration System (SCIS), Space Defense Operations Center 4 (SPADOC 4), Communication System Segment Replacement (CSSR), Command Center Processing Display System—Replacement (CCPDS-R) and Granite Sentry. All of these programs combined will replace the current 427M system. Each of these programs is briefly described below:

The Survivable Communications Integration System (SCIS) program will provide the message traffic control and management capability to pass critical Ballistic Missile Warning message traffic simultaneously over multiple communications media under stress of nuclear war. The SCIS is a critical portion of the overall Integrated TW/AA system, providing that essential, secure, survivable communications needed to ensure that Tactical Warning and Attack Assessment messages flow to the National Command Authorities. Through its ability to utilize all available secure and survivable media, SCIS will ensure that warning and assessment are provided when required.

The Communications System Segment Replacement (CSSR) program will replace the current Communications System Segment

housed within the Cheyenne Mountain Air Force Base (CMAFB). The system monitors/switches all data communications lines entering the CMAFB and provides data distribution for all space, air and missile warning data within the CMAFB. CSSR is the "lynchpin" of all CMAFB upgrade programs by providing a distributed intermission communications capability. In addition, the replacement program will improve reliability, maintainability and flexibility of the CMAFB communications processing function.

The Command Center Processing and Display Replacement (CCPDS–R) Program replaces the existing CCPDS and provides a Ballistic Missile Tactical Warning/Attack Assessment processing capability for the Cheyenne Mountain Air Force Base (CMAFB) and the Offutt Processing and Correlation Center (OPCC). CCPDS–R will be the primary information display system used by the National Command Authority, the office of the Joint Chiefs of Staff, CINCNORAD, USCINCSPACE, CINCSAC and their staffs; and as such will provide a Processing and Display (PDS) subsystem at the NMCC at the Pentagon, the ANMCC, CMAFB, OPCC, and SAC. CCPDS–R will also include a subsystem at HQ SAC to perform SAC unique mission processing.

The Space Defense Operations Center Phase 4 (SPADOC 4) program develops two command and control centers to support the operational mission of the Commander in Chief of the US Space Command (USCINCSPACE). An evolutionary, three-block development, SPADOC 4 will initially provide the automated capability to assess and respond to threats to U.S. space systems, and to maintain the status of U.S. assets. Present development concentrates on upgrading and replacing the existing, antiquated Space Surveillance Center. Improved capabilities will be provided to track and maintain orbital status of all objects in space with greater accuracy using improved workstations.

Granite Sentry provides separate Air Defense Operations Center processing, Command Post processing, Battle Staff Support Center processing and Weather Center processing.

The relationship between these programs is best understood in how they provide the flow of information from the warning sensors, satellites and radars, to the National Command Authority decision makers, our forward users. Standard sensor messages, transmitted through the communications network to the Cheyenne Mountain, are sent through CSSR to the proper center for processing. Each center processes their messages and forwards the data to the command post processor for further evaluation and CINC assessment. This information is forwarded through the communications network to the standard display systems at various locations world wide via a standard correlated message set for use in the JCS Emergency Actions Conference decision making process.

Question. Compare the original fielding date of each system to your current estimated date.

Answer.

System	Original IOC date Qrt/FY	Current IOC date Qrt/FY
SCIS	4/90	2/91
SPADOC4A	4/85	3/89
SPADOC4B	1/87	1/91
SPADOC4C	1/88	1/95
CSSR	1/89	3/91
CCPDS–R	4/91	4/92
Granite Sentry:		
Block I	1/89	2/89
Block II	2/90	2/91

Question. What was the original total acquisition cost of these upgrades supposed to be, and what do you now estimate?

Answer.

[In millions of dollars]

Cost estimates program	Original estimate	Current estimate
SCIS	122	136
SPADOC4	340	490
CSSR	219	257
CCPDS–R	247	268
Granite Sentry	139	177

Question. The Committee understands that a number of key assumptions are still undefined, such as the scope of SPADOC Block 4C and costs to convert to "open systems" protocols for example. Until you have done the planning for such items, how can you know what the total program will cost?

Answer. I agree that there are bound to be some unknowns yet before us. The two you mention, however, are behind us now—I cover those in detail in answers to other questions. I believe the Air Force now has a firm understanding of the problems that have occurred in these programs and an executable plan to complete these programs. My confidence for the future is based on the unanimity of purpose I see between U.S. Space Command, Air Force Space Command, and the Air Force Systems Command, to address any remaining or future issues and find sound solutions within our cost and schedule alternatives.

COMMUNICATIONS SEGMENT SYSTEM REPLACEMENT (CSS–R)

Question. In November, 1988 GAO reported on the communications subsystem called CSS–R (Communications Segment System Replacement), which moves computer data received from worldwide satellite and ground sensors for use within Cheyenne Mountain. CSS–R is estimated to cost $281 million and is 2 years behind schedule and $80 million over cost.

In a nutshell, GAO says that CSS–R is "behind schedule, over budget, does not meet established requirements, and is incompatible with other NORAD equipment." Is that inaccurate?

Answer. The GAO was essentially correct concerning the problems they discussed in our original program. Both the Air Force

and the contractor underestimated the complexity of the effort. The initial schedule was unachievable, and the program slips and higher complexity have driven up costs. I believe that we now have a firm understanding of the problems that have occurred and that we have an executable plan to complete the program and meet our requirements. As I indicated in my testimony, our "fixes" are well underway, on schedule and within projected budget. The contract for the facility modifications to correct our wiring was awarded. The fixes to all but one of the twelve open action items reported to the GAO have been defined by the contractor. The baseline for the Standard Survivable Message Set has been approved and is on contract.

Question. GAO says the computer equipment received under this contract cannot be "plugged into" the facilities at Cheyenne Mountain because the wires are incompatible. Is the equipment in operational use for actual missions at Cheyenne Mountain?

Answer. The wiring problem you refer to is a direct reflection of the evolutionary changes in the communication systems that we have to interface with in the Mountain. The industry, its technology and standards, has evolved rapidly. We have to communicate with a very large number of voice and data systems in the outside world. Each of those systems has gone through its own "modernize versus maintain" decision over the years as the commercial technology and standards have changed. Those are tough decisions in both the costs and the impact of obsolescence as the commercial technology changes.

When we started the CSSR development, we baselined our contract at the circuit configurations that those systems anticipated for the 1990 time frame. This didn't turn out to be accurate in all cases. As a result we have had to rectify the differences on a case-by-case basis. Our re-wiring effort, currently in implementation, will correct these incompatibilities by installing adapters to convert or match wiring standards where differences exist. All CMAFB communication circuits and the corresponding CSSR interfaces will be compatible by the projected installation/IOC date.

No CSSR equipment is in operational use at this time at Cheyenne Mountain. CSSR has not yet completed development. CSSR Block I is in the first part of its testing phase, Developmental Test & Evaluation (DT&E). This phase of test is accomplished by contractor testing. After factory test is complete, DT&E testing continues in AFSPACECOM's Test, Development and Training Center (TDTC). Block I equipment has been installed in the TDTC, however installation in CMAFB has been delayed, to decrease cost, until 1990 along with Block II.

Question. GAO says that the Air Force accepted the computer equipment under "Block I" of this contract, but that the applications software to make it work will not be ready until 1991. Why did the Air Force accept the equipment?

Answer. The GAO report contains a misunderstanding of the Air Force's actions with regard to the closing of the Block I contract and the status of the Block I equipment.

During the Block I FQT Testing, it was realized that an end to end system test of CSSR was more appropriate to qualify the system as a whole. The contract was appropriately modified to in-

corporate this more complete method of test in Block II. When this was affected, all other work under the development contract line item (CLIN) had been completed and therefore GTE was entitled to liquidate the CLIN.

The Air Force closed the Block I contract in November 1988, and transferred remaining Block I tasks to a task in Block II. The remaining tasks are the system test and the 12 open action items to be fixed at no cost. The Air Force will accept Block I with Block II, as a complete system, after the CSSR system meets all contract specifications.

Question. How much did we pay for equipment?

Answer. The equipment was not separately priced but was included in the CLIN that was closed. The value of this CLIN was $40 million.

Question. How much does it cost annually to maintain it and why should the Government assume this cost?

Answer. There is no additional cost to the Government to maintain this equipment. The maintenance of all the development equipment prior to system testing is included as part of the fixed price Block II development contract. Appropriate compensation was negotiated as considerations to the Government during the Block I closeout/Block II modifications described above.

Question. How will equipment be used until 1991?

Answer. Equipment will be used for development of planned tech control upgrade and for installation into CMAFB.

Question. Was the CSS–R contractor's work completely satisfactory under Block I of the contract, and did the Government get what it originally contracted for under that Block? How many "open items" were identified? How were these "open items" resolved? What "open items" still exist? How many "open items" were "deferred" to be resolved in Block II of the contract, and who pays for them? How many "open items" have simply been deferred until after the entire system becomes operational, and who would pay for them?

Answer. There are 12 open action items from the original contract Formal Qualification Test (FQT). These "discrepancies" will be resolved as part of the full FQT of both Block I and Block II together to be run in mid 1990. Solutions have been discussed and seem adequate; however, these items cannot be formally closed out until a formal test is conducted. All of these open "discrepancies" will be resolved prior to system acceptance, before the system becomes operational.

Question. Why did the Air Force award Block II of the contract for $209 million on a sole source basis if Block I costing $72 million did not work properly?

Answer. The contractor's performance under Phase I was satisfactory. At the point the Phase II contract was awarded, all contractual obligations had been met. The contractor did go to contract ceiling price on the Block I portion of the contract. However, the contractor's overall performance was judged to be sufficient to award the next portion of the competitively awarded contract.

There were no problems when Phase II was awarded; however, no testing had been accomplished at the time of contract award.

Question. What is the risk of having to replace the equipment we now own under this contract in 1991, when the applications software for the full system is tested for the first time? If bigger or more modern computers are then needed, under your acquisition strategy wouldn't such a cost now be the responsibility of the government? Why is this wise?

Answer. We have recognized the risk of hardware and systems development for this program. We are using state-of-the-art computers to accomplish the mission and, by selecting the host computer and building systems, knowing the host computer, we reduce the risk of incompatibility. We have sized our computer on the threat today, and the projected mission requirements based on the projected threat. Of course, if the threat changes we may have to increase the computer's memory, but our choice of computers also allows for this. Within the current design we have intentionally planned for future growth (within memory) processing capacity and addition to new missions.

Question. Why shouldn't the Air Force suspend CSS–R development until the technical issues identified by GAO are resolved?

Explain for the record what analyses were done to support the Air Force position that it should continue with the development of CSS–R without resolving these technical issues. Address specifically how costs associated with deferred items (such as communications protocols) are treated.

Answer. The critical technical issues identified by the GAO have been substantially resolved and suspending the contract would only delay their implementation. A standard communications protocol has been developed, the Standard Survivable Message Set (SSMS) has been incorporated into the contract and will be in place at IOC and we remain confident that program requirements will be met using the Granite Vista II message loading scenario.

As for deferred items such as the communications protocols, it is our intent, per our transition plan, to implement the Open System Interconnection (OSI) protocol after IOC in April 1991. AFSPACECOM will budget for required funding for implementation in the upcoming POM. This subsequent upgrade will in no way preclude the installed system from operating together.

Question. What is the current cost and status of the program?

Answer. The current projected cost of the total program is $257.5 million. The program is currently on schedule and within budget.

SPACE DEFENSE OPERATIONS CENTER (SPADOC)

Question. In April 1989 GAO reported on the Space Defense Operations Center (SPADOC), which is now estimated to cost $437 million. This system—which is critical to our ability to track all objects in space in order to protect our satellites—is 3 years behind schedule, $147 million over budget, and may be finally installed in Cheyenne Mountain up to 7 years late.

How is the SPADOC mission done today and how critical are these computer upgrades?

Answer. With SPADOC 4A being declared operational on 25 April 1989, we now have, for the first time in the history of SPADOC, a fully automated system to perform this critical space

defense mission. Prior to SPADOC 4A becoming operational, all we had was 1970's vintage teletypes and a 427M console. This essentially manual operation severely limited our ability to handle multiple threats.

Question. GAO says that Block A of the SPADOC contract costs $119 million and was accepted by the Air Force in April 1988 even though it could only perform 7 of 23 required mission functions. Is this accurate?

Answer. No. What the GAO report actually says is: "Although the Block A has been in development since April 1983, it cannot perform 14 of 23 required mission functions quickly enough to satisfy contractually specified quantitative performance requirements." This does not mean that the system could only perform 7 of 23 mission functions. Quite the opposite, we accepted the system because it satisfied our mission requirements. Those specifications which were not met, were waived for Block A, but not deleted for Block B.

Question. Is the equipment accepted under SPADOC Block A in operational use for actual missions at Cheyenne Mountain?

Answer. Yes. The SPADOC 4A system was declared operational on April 25, 1989 and is in operational use.

Question. GAO says that when Block A was accepted, 90 "critical" deficiencies were identifed. Why did the Air Force accept a deficient system from the contractors? How many of these deficiencies are the liability of the contractor to fix, and how many have been "deferred" to Block B so that the government can pay for them to be fixed? Will the government incur any additional costs in resolving these deficiencies?

Answer. "Acceptance" of Block A by ESD was a contractual action to allow stabilization of the baseline being used for Block B development. ESD's acceptance was not the same as turnover for operational use. That did not take place until there was a plan in place to correct all 90 deficiencies prior to system turnover to AFSPACECOM for operational use. The fixes for all 90 deficiencies were incorporated into the Block A system delivered to AFSPACECOM. Of the 90 "critical" deficiencies referenced by the GAO, 35 were considered in scope of the SPADOC 4A contract. These have been fixed in the Block A system and will be incorporated into the Block B system at no additional cost to the government. The remaining deficiencies were beyond the scope of the contract and the government must pay for them.

Question. Block A was determined not to work in April 1988. What was the logic of awarding Block B of the contract for another $103 million, 2 years earlier?

Answer. The Block B contract was awarded in June 1986. At that time the Block A development was essentially complete. Coding had ceased and Ford was planning to layoff many of the experienced personnel who could be effective in Block B and program continuity. The best estimate at the time of Block B contract award was that we were only nine months away from Block A IOC. Block A didn't encounter serious difficulty until system testing. These first indications of Block A performance problems didn't occur until after Block B contract award.

Question. We understand that the contractor recently flunked the Air Force's "critical design review" for Block B. Why?

Answer. You must be referring to the Block B CDR conducted in December 1987. At that CDR, the contractor based his design on a false assumption—that the government would waive contractual performance requirements for the Block B system. That was an incorrect assumption. The design he presented did not comply with performance requirements on contract. We therefore failed the critical design review.

Since that time, the contractor has significantly improved his Block B design. A follow-up Block B system CDR was conducted 15–19 May 1989. Although the final assessment has not been made, it appears to have been a success. ESD has approved the new design contingent on the resolution of a few outstanding action items.

Question. We understand the Air Force is now considering the contractor's proposal to upgrade the design by using bigger, more powerful computers which may cost $50 million, in the hope that more computational "speed" will solve the apparent problems. Why is this necessary, and who pays for it? What are the implications for equipment accepted by the Government under Block A of the contract—will it be scrapped?

Answer. The Air Force is currently contracting for IBM 3090–200 mainframe computers as a part of the SPADOC 4B development. Both government and contractor estimates indicate that the current SPADOC 4 mainframe computer family would not be able to handle the requirements of Block C. The government will save approximately $10 million by converting to IBM 3090s now rather than waiting until Block C. Additionally, the 3090 family of computers allows for significant growth if that should be required in the future. The costs for this upgrade are shared between the government and the contractor.

Most of the peripheral equipment, i.e., hyperchannel adaptors, disc drives, computer and operator consoles, etc., will be retained to support 4B operations. The IBM mainframes and remaining support equipment will be retained by the Air Force to support other mission requirements.

Question. Have you defined SPADOC Block C? If not, how can you be sure the new hardware under Block B will not have to be scrapped again under Block C?

Answer. The technical baseline preparation work that was done for 4B deliberately concentrated upon the new architecture's ability to meet 4C requirements which are in the early stages of coordination. ESD's preliminary performance modeling work indicates that the 3090–200s architecture will be sufficient to meet 4C workloads between 1995 and 2000. As a matter of fact, preliminary modeling runs that considered upgrades to the 3090–200s showed little reason to believe that any upgrades would be necessary to the 3090–200s to support the initial 4C workload. We are continuing to work to resolve these requirements.

Question. GAO says that the Air Force allowed the SPADOC contractor to continue developing Block A "without solving known problems" and permitted Block A to pass through five development phases "without resolving critical concerns at established decision

points." What is the Air Force doing to ensure more discipline in future SPADOC work?

Answer. For every known problem that surfaced during the course of 4A development, the Air Force developed a strategy to deal with it. Through the last one and a half years, the Air Force has faced every critical decision point with an issue resolution exercise, followed by an engineering change proposal technical evaluation and cost negotiation process to implement the resolution of the issue. The SPADOC 4B issue resolution process culminated in the conducting of a technically successful CDR during the week of May 14, 1989.

Question. What percent of the work for both Blocks A and B have been completed at this time, and at what cost for each?

Answer. Block A: 100 percent complete, $167 million (includes government related costs). Block B: 67 percent complete, $162.8 million.

Question. What is the current cost and status of the program, for all blocks and by block?

Answer. Block A is complete at a cost of $167 million; the system is operational with IOC declared April 25, 1989.

Block B has just gone through the significant milestone of Critical Design Review (CDR) and we are waiting final results. It is expected to cost $218 million with a turnover scheduled for early 1991.

The Block C system specification is in the draft stage. Block C is expected to cost approximately $115 million and be operational in FY 1995.

Question. When will Blocks A, B, and C become operational?

Answer. Block A achieved initial operational capability (IOC) on April 25, 1989. Block B IOC is scheduled for early 1991. Block C is not yet on contract. However, IOC is projected for FY 1995.

Question. How much of the funds appropriated for Block B will be used to correct Block A deficiencies?

Answer. The government will spend no funds to correct Block A deficiencies which have been determined to be within the scope of the contract. However, the users have identified additional operational requirements which are over and above the Block A contractual base-line. It will cost approximately $7 million to add these new requirements to the Block B contract.

Question. What are your plans for Block C, and what funds will be required (and in what fiscal years)?

Answer. We will start Block C only after Block B has been successfully completed. The extensive overlap experienced with Block A and B will be avoided. Plans are being formulated which will allow for incremental phasing in of Block C capabilities through the vertical release process. The Block C Budget Profile is still being worked, but at present it appears to be approximately $115 million.

Question. When does the Air Force expect to complete Block C, and have a fully operational SPADOC–4 system that will meet all requirements? Does the Air Force plan to continue modifying the same contract for SPADOC Block C?

Answer. Block C is not yet on contract. However, IOC is projected for late 1995. A decision on whether we will continue Block C

with the current SPADOC 4 contractor or open up the final Block for bids has not been made. The government is keeping their options open at this time.

INTEGRATION ISSUES

Question. In March 1989, GAO released its draft audit on the integration of the five Cheyenne Mountain projects which in total will cost $1.3 billion. GAO says:

"After almost 8 years of development, no phase of any of the 5 modernization programs is operational. The Air Force estimates it will need an additional $535 million and 5 more years to complete the modernization it initially planned to complete by 1987. Longstanding, serious integration problems, which could disrupt the ability of the various modernization programs to work together effectively to accomplish NORAD's mission, remain unresolved."

"Critical integration problems exist among the five modernization programs, such as subsystems being built to differing communications standards and attack scenarios. These problems and 46 others have been addressed through a cumbersome resolution process since 1984; the most serious remain unresolved." Development activity has continued in the face of these known, unresolved problems, and potential solutions will become more complex, harder to implement, and more costly."

The biggest problem you have is to integrate the 5 Cheyenne Mountain computer upgrades which up to recently have been separately managed. How are you going to do that?

Answer. The best way to change an operational system while it is still in operation is to do it systematically, in manageable pieces. We are building, testing, and installing the Cheyenne Mountain upgrades in segments to ensure technical integrity of the Integrated Tactical Warning/Attack Assessment (TW/AA) system. We learned with the installation of the current system (427M) that one massive acquisition with one IOC is too encompassing to fully ensure integrity of all aspects of the Integrated TW/AA system. Our approach of installing logical segments and testing and operating the new segment side-by-side for a time with the old provides us the optimum approach to maintaining confidence in the system while we incorporate the needed operational improvements.

Question. GAO says that U.S. Space Command has not formally defined the "operations concept" for Cheyenne Mountain. What is the status of this initiative, and when will it be completed?

Answer. The overall concept of operations of the system of upgrades we are building has been spelled out for some time. At a top level, it is described in such requirements documents as the USSPACECOM Required Operational Capability for the ITW/AA System, September 1988 and the Multi-Command Statement of ITW/AA Information Requirements for Unified and Specified Commands, June 1989. When the new systems come on-line, overall operations will not change drastically from today's operations. These are well defined in several JCS, NORAD, and USSPACECOM documents. I have recently approved these concepts. My staff is also in the process of combining these elements into a single ITW/AA op-

erations concept document. I expect this initiative to be completed by Fall 1989.

Question. How can you have $1.3 billion of computer acquisitions underway without having a formal "operations concept" describing what they are to accomplish?

Answer. As I indicated in my previous answer, the overall operations concept for using the new systems will not differ significantly from the existing concept for over 90 percent of the elements we are building—remember, the new systems in most cases do not add new functions, they simply perform the same functions more efficiently. For the remainder, the overall concepts have been documented and understood for some time. As we have proceeded, questions have arisen regarding such items as determining functional equivalency between centers, criteria for switchover to alternate processors, use of the common displays in decision making, etc. We are addressing these questions and developing a consolidated new operations concept document to ensure that we have a clearly understood concept.

Question. Do all 5 computer modernization programs use the same sizing, wiring, communications, and security assumptions?

Answer. All five programs, after all phases are complete, will use compatible wiring and communications standards. Some of the intermediate phases like Granite Sentry Phase I and SPADOC 4A must interface with the existing system and cannot use the final communication protocol. It has always been planned to update these programs in later phases to interface with the CSSR program. Each program uses the same security regulation for guidance in implementing their respective security requirements; however, each program has different security requirements because of individual, unique missions they are trying to accomplish. Since each program is oriented towards a specific mission area (SPADOC 4 with space defense, CCPDS–R with missile warning, CSSR with communications, etc) the required sizing demand on each program processor may differ. We have efforts underway, however, to ensure that those sizing demands are mutually consistent.

Question. To what degree are the acquisitions in this $1.3 billion program incompatible with each other?

Answer. We have been analyzing the five program interfaces for sometime and have not found any show stoppers. This does not mean the programs will smootnly work together today, but we have identified the interface issues and are on the drawing boards working them. We have expanded our look to include sensors and other systems that interface with the five Cheyenne Mountain upgrade programs to ensure that the complete end-to-end system works properly when installed.

MANAGEMENT RESPONSIBILITY

Question. Concerning the Cheyenne Mountain programs, GAO says "accountability has been diffused across a large, multi-command management structure and further diluted by frequent turnover in key command and management positions. No single, accountable manager below the Air Force Chief or Staff has authority for the total Tactical Warning/Tactical Assessment system."

Who's in charge of the Cheyenne Mountain program?

Answer. Lt. General Kutyna, as Commander of Air Force Space Command is in charge of the programs. The Air Force Chief of Staff has delegated that responsibility to Lt. General Kutyna as the System Executive Manager.

Question. GAO reports that "every commander, vice commander, key directorate head, and program manager (with 2 exceptions) has changed several times during the lives of these programs." How do you plan to introduce more stability into the Air Force management process?

Answer. The turnover of personnel in the Air Force and in these particular programs is not unique in the DOD environment. With respect to the high level of turnover of program managers, Air Force Systems Command has taken several actions to improve the situation. First, as of May 1988, each Program Director with responsibility for an executive program is handpicked by the Commander, Air Force Systems Command, based upon proven performance and personal capabilities. Second, per DOD Directive 5000.23, tour length for Program Directors and Deputy Program Directors are specified as a minimum of four years or completion of a major milestone. The Air Force Systems Command has also taken steps to improve the quality of Program Directors and Program Managers. First, a career development program was implemented in July 1986 requiring certification of individuals based upon minimum levels of education and experience. Second, in December 1987, Air Force Systems Command began an effort to identify key program office positions requiring the most qualified individuals. Individuals assigned to these key positions must have been certified through the career development program. Finally, the Air Force Systems Command is in the process of revising the list of key positions and has received ESD's input. This input requested that all five program managers, and the Chief Engineers of the Space Defense Operations Center, The Survivable Communications Integration System, and the Communications System Segment Replacement be identified as key positions.

Question. GAO reports that "responsibility and accountability is divided among 6 commands, a test center, and over 200 directorates, boards, and working groups." Do all these organizations report to General Kutyna, and how will he manage this structure when others have not been able to?

Answer. It is because of the original recommendations for a "system of systems" approach and the recognition of integration problems that the DOD created an executive management structure in 1981 to provide a single manager with oversight of the end-to-end system. That single manager is the System Executive Manager, who is also the Commander, Air Force Space Command. To further enhance the management of the system and in recognition of the many commands involved in the system life cycle, the 1981 Program Management Directive was updated on January 12, 1989, to assign more clearly the responsibilities to all tasked organizations. And, while not all the organizations identified by the GAO report are directly responsible to Lt Gen Kutyna, he has sufficient authority as Commander of Air Force Space Command and/or

System Executive Manager to ensure compliance with his direction.

The report alleges that management inefficiencies have occurred during this difficult acquisition process, which may be related to the complex nature of supporting infrastructure of boards, committees and working groups. In response, the Office of the Secretary of Defense will direct the Air Force to accomplish an independent management review of the infrastructure, with the specific intent of streamlining, consolidating and eliminating, as necessary, in order to improve the management decision process required to manage the Tactical Warning and Attack Assessment System throughout its life cycle. The Office of the Secretary of Defense will request that the Air Force report back within six months as to the independent review findings, conclusions and recommendations.

Question. GAO reports on a committee of general officers, called the Senior Review Group. This group has been ineffective in solving integration problems because it can't reach consensus solutions, won't raise issues to higher level decision makers, and "consistently" refers issues back to staff for further coordination and analysis. What specifically will be done to eliminate this bottleneck?

Answer. Rather than being ineffective, the SRG has proven to be a very effective mechanism for elevating and solving integration problems that affect all three commands. They are another tool available to General Kutyna to manage the system-of-systems. The SRG has resolved over 50 major action items, showstoppers and disconnects in a timely manner with no increase in program cost. However, issues that have not been thoroughly investigated prior to SRG review must be referred back for additional research. Some of the referrals may look like indecision if taken out of context, but the SRG's track record shows otherwise.

Question. Any DOD system whose R&D cost exceeds $200 million or whose total cost exceeds $1 billion requires a review by OSD's Defense Acquisition Board. The Cheyenne Mountain upgrades in aggregate qualify on both counts. Why were DAB reviews never conducted?

Answer. Each program started at different times, to solve specific problems or fill unique needs. Two of the programs were even in separate Program Elements (SPADOC and CCPDS-R), and individually the five initial cost estimates for the programs never exceeded DOD dollar threshold requiring DAB review. Only one of the programs, the Command Center Processing Display System—Replacement program, was placed under the DOD MAISRC oversight process.

Question. Last year the Committee directed that the Cheyenne Mountain upgrades be consolidated and subjected to a DAB. Why did the Congress have to direct the Air Force to follow normal acquisitional rules?

Answer. The Air Force was following normal acquisition policy for the five individual programs. Each program was reviewed by the Air Force Acquisition Executive and it was determined the Program Executive Officer would be the Commander, Electronic System Division (ESD) and that the Acquisition Executive Agent would be the senior Air Force Acquisition Officer. As individual programs, with the exception of CCPDS-R, OSD oversight was not

required for these programs. Moreover, while consolidation of the programs seems to make sense, there was no legal reason or acquisition rule that required it and so as long as the programs were separate, there was no requirement for DAB review.

Question. When is the DAB we required now scheduled?

Answer. The Defense Acquisition Board (DAB) review process is a lengthy process that requires several reviews within the Air Force and OSD prior to the actual DAB meeting. The Cheyenne Mountain Upgrade program has successfully been through the Air Force Board Structure and is currently in the Secretary of the Air Force review structure. This should be completed early August, which will allow the OSD review cycle to begin and a DAB to occur mid to late August.

Question. Do you think that the Air Force can produce the necessary analysis and documentation to OSD to successfully pass the review by June?

Answer. The Air Force is well on its way to producing the proper documentation for the Cheyenne Mountain Upgrades DAB meeting. This includes to date: a DIA documented and validated System Threat, a draft Test Evaluation Master Plan (TEMP), a preliminary Acquisition Program Baseline (APB), a draft Decision Coordination Paper (DCP), and a coordinated Integrated Logistic Support Plan (ILSP). The Secretary of the Air Force is performing an Independent Cost Analysis (ICA) of the Cheyenne Mountain Upgrades in support of the DAB. I feel confident that the Air Force will have the proper documentation in time for the DAB which is planned for August.

Question. If the Air Force cannot "sell" its Cheyenne Mountain acquisition strategy to OSD through the DAB process, what would this mean to the Congress as far as your FY 1990 Cheyenne Mountain funding request is concerned?

Answer. I believe that the Air Force now has a firm understanding of the problems that have occurred, and more importantly, that the Air Force and its contractors have an executable plan to complete these programs. While we are not out of the woods yet, I am confident that there is unanimity of purpose between U.S. Space Command, Air Force Space Command and the Air Force Systems Command which will enable us to field these badly needed programs—within current cost—and on the current schedule. Obviously, however, if the DAB did not approve the current program structure outyear funding requests would be impacted.

Question. Has the Air Force completed and documented a cost/benefit analysis that demonstrates a cost effective and efficient approach for achieving Cheyenne Mountain's future communications needs? What did the analysis show?

Answer. I assume that you are asking about the data communications protocol standardization concern that was highlighted in the GAO report on CSSR. In May 1988 the Air Force completed and documented an initial cost benefit analysis to support a review of alternatives by our Requirements Review Council. A summary from that study was provided to your committee staff as part of the November 1988 Air Force Final Report on the CSSR program. The study analyzed a range of alternatives for implementing standard communications protocols in the CMU programs. The study found

that early implementation of the new ISO/OSI protocols would affect three modernization efforts and cost an estimated $26 million with at least a six month delay in schedule. In addition, about four to six months would be required to put the ISO/OSI protocol on contract. The benefit of such an action would be achieving an early standard versus maintaining the widely used and mature TCP/IP Protocol standard. The current contractual protocol did not present any significant technical or operational risk. However, there was some increased risk in implementing ISO/OSI since it was still relatively new and commercial products were still evolving. The study further recommended that the present data protocol on contract for the CSSR program should be retained and that the SIO should develop a protocol transition plan to achieve a standard protocol configuration after planned modernization programs are implemented and stabilized.

Those recommendations were approved by the RRC. Details of the transition plans are covered elsewhere in my testimony.

Question. When does the Air Force plan to report to the Congress on action taken to correct program and management problems which have affected the modernization efforts?

Answer. I believe that the testimony provided by myself, General Kutyna and General Welch to this Committee has provided you initial indication of the steps that we have taken to address these issues.

REDUNDANCY IN OPERATIONS

Question. Common sense suggests that as a new system is phased in, the old one is phased out. Originally CSS–R was to have been completed before the SPADOC upgrade arrived, but both have encountered serious delays. General Piotrowski, when the new CSS–R system is delivered in 1991 after an expenditure of $257 million, will you shut off the current CSS system shortly after that time?

Answer. Since the current system is a monolithic structure which includes several mission elements such as Air Defense, Space Defense, Missile Warning, Command Post and Battle Staff Support, it cannot be completely turned off until the last phase of the Cheyenne Mountain Upgrades is on-line. This should occur in late FY 1995 or early FY 1996. As programs come on line, and are verified the existing system will no longer be required to support that mission and that part of the existing 427M system can be dismantled and removed. This transition from existing monolithic system to the distributed system of the future has been spelled out in a Transition Plan for the Cheyenne Mountain Upgrades. This transition plan has been developed and is continuously updated to reflect changes in program schedules and system events. The Air Force is using this transition plan along with other techniques to find and resolve integration issues. This transition plan also supports the Air Force in determining necessary funds required for dual operations while existing elements are being replaced. Specifically, when the CSSR program comes on-line, the current system CSS is still required for 3–4 years to support the entire system transition.

Question. When you deliver the new SPADOC system (Blocks A and B) after spending $415 million, will you shut off the current SPADOC-3 system shortly after that time?

Answer. The acquisition of SPADOC 4 was planned for in 3 phases.

SPADOC 4A automated the SPADOC Watch Center (SPADOC 3). Block B provides us with some improvements in SPADOC operational capabilities. However, the primary function of the Block B development is to rehost the first half of the 427M Space Surveillance Center (SSC) functions, a separate watch center. We will need to keep the 427M SSC system on line until the completion of the SPADOC 4 Block C development, which rehosts the remaining SSC functions.

We expect to keep the SPADOC 3 capabilities on-line at least until Block B IOC. This provides us a contingency in case the SPADOC 4A system must be turned off to support Block B testing. However, when the SPADOC 3 hardware is deactivated, the cost savings will not be significant until the completion of Block C.

Question. How much will it cost the government to run the old CSS and the old SPADOC system in parallel with the new CSS-R and SPADOC Block A/B computer systems because the new computers are incompatible with each other? Does this make sense?

Answer. Dual operations of CSS and CSSR is necessary to maintain our warning capabilities while we prove and verify the new capabilities. Eventually, CSS will be removed in accordance with the transition plan I described earlier. The support to keep the CSS operational has been determined and budgeted for (on averages $4.9 million per year is budgeted for CSS hardware and software maintenance).

As I indicated in an earlier question, this approach is the soundest, and possibly only viable, approach to upgrade a complex system with as critical a mission as Cheyenne Mountain while it continues it's operation.

COMMUNICATIONS PROTOCOL

Question. Communications protocols are rules that govern communications among computer systems. A single protocol standard is needed for effective communication among the 5 Cheyenne Mountain subsystems. Why are the 5 Cheyenne Mountain upgrades being designed and developed using 3 different communications protocols?

Answer. The upgrades are being designed with two different communications protocol suites. The CSSR and CCPDS-R programs will use a protocol suite developed by the CSSR contractor, GTE Government Systems Division.The Granite Sentry program will use protocols based on the Open System Interconnect (OSI) Reference Model. SPADOC 4C is not on contract; no protocols have been chosen. SCIS is not affected by the protocol differences between programs. GTE has developed the CSSR protocols based on military standards 1777 and 1778 (Transmission Control Protocol and Internet Protocol). The standards specify technical details of the protocol implementation. In addition, they have added custom protocol functions to accommodate the CSSR architecture. The OSI proto-

cols become mandatory for new DOD acquisitions beginning in August 1990. Realizing the DOD will begin moving to the OSI protocols, Granite Sentry decided to use them. Granite Sentry will use a device known as a gateway to perform protocol conversion, allowing them to interface to CSSR.

Question. Are these 3 protocols compatible?

Answer. The two protocol suites do not interoperate without protocol conversion devices (gateways). Granite Sentry will use such a gateway to interface to the CSSR.

Question. The General Accounting Office says that the Air Force knew this was a problem in 1986. Explain why 22 Air Force organizations involved in at least 74 coordination activities and meetings failed to produce any tangible results to solve it.

Answer. The referenced activities were part of the development and coordination process necessary to develop System Integration Office Engineering Standard 1100, which is the technical publication for implementation of the OSI protocols. The commonality issue arose in 1988 after the Requirements Review Council adopted SIO-STD-1100 for the Integrated Tactical Warning/Attack Assessment System. The Air Force has been working since January of 1988 to develop a sound and cost effective plan for transitioning to standard protocols. In the long run, commonality and compatibility is achieved; however, during transition to a new standard, some patches are inevitable.

Question. Explain the Air Force's strategy on communications protocols, which looks to us like you are simply dismissing the problem until after the computer upgrades are fielded and then plan to come to us for expensive "retrofit" funding.

Answer. As I have indicated earlier, our decision to postpone implementation of the new ISO/OSI protocol was based on a risk/benefit analysis not simply a dismissing or deferring of a problem. In May 1988 the Air Force completed and documented an initial cost benefit analysis to support a review of alternatives by our Requirements Review Council. A summary from that study was provided to your committee staff as part of the Nov 1988 Air Force Final Report on the CSSR program. The study analyzed a range of alternatives for implementing standard communications protocols in the CMU programs. The study found that early implementation of the new ISO/OSI protocols would affect three modernization efforts and cost an estimated $26 million with at least a six month delay in schedule. In addition, about four to six months would be required to put the ISO/OSI protocol on contract. The benefit of such an action would be achieving an early standard versus maintaining the widely used and mature TCP/IP Protocol standard. The current contractual protocol did not present any significant technical or operational risk. However, there was some increased risk in implementing ISO/OSI since it was still relatively new and commercial products were still evolving. The study further recommended that the present data protocol on contract for the CSSR program should be retained and that the SIO should develop a protocol transition plan to achieve a standard protocol configuration after planned modernization programs are implemented and stabilized.

Those recommendations were approved by the RRC. Details of the transition plans are covered elsewhere in my testimony.

Question. Since none of the Cheyenne Mountain upgrades are designed or fielded, why not make the move to a single standard?

Answer. All the upgrades except SPADOC 4C are in the advanced design or full scale production stages and changes now will seriously delay current schedules and involve additional technical risk and funding.

Question. Explain your use of "open systems" standards—which apply to all computers in the Federal Government—on some but not all of the Cheyenne Mountain upgrades. Isn't it less risky and costly to incorporate a standard protocol into the modernization program now, rather than to delay to the mid-1990s and have to retrofit operational systems?

Answer. The open systems standards do not become mandatory until August 1990, and then only for contracts let after that time. In addition, the Transmission Control Protocol (TCP) and Internet Protocol (IP) specified by military standards 1777 and 1778, and being used in CSSR, will exist as costandards with the OSI protocols for several years.

As I indicated in my answers to a related question, our alternatives study showed that at the time there was less risk to our programs in proceeding with the mature TCP/IP implementation, with the intent to transition to the new ISO/OSI standard in a phased fashion that allows us to balance cost and risk.

Question. How much would it cost to incorporate "open systems" standards as a requirement in each of the Cheyenne Mountain contracts? How much additional would be needed in FY90?

Answer. As I indicated in response to an earlier question, our initial cost/benefit study in 1988 indicated that it would cost an estimated $26 million to incorporate the new ISO/OSI protocol in the three affected CMU programs. However cost was only one of the considerations in our decision to phase the transition of systems to this new standard. A schedule delay, both in contract and technical implementation, of nearly a year was involved. Additionally we would have faced an increase in overall technical risk in an already complex software acquisition. The mature TCP/IP protocol then on contract did not present any significant technically or operational risk. However, there was some increased risk in implementing ISO/OSI since it was still relatively new and commercial products were still evolving. Our decision was based on overall consideration of risk and benefit not simply funding availability.

Question. If standard protocols are not implemented now, what is the cost and what steps can be taken to minimize the cost of maintaining 3 different protocols until the mid-1990s?

Answer. The exact costs will depend on the specific approach that we take to implement the ISO/OSI protocol in CSSR and CCPDS-R. Those alternatives are still being examined by Air Force Space Command and the SIO. As I indicated earlier on this subject, our decision to not implement the ISO/OSI protocol on these programs in 1988 was based not merely on minimizing cost but on minimizing risk as well. In this context, the steps that we have taken appear to be the soundest approach both in risk and in minimizing our overall costs to maintain the equipment. The contract protocol, TCP/IP, is very mature and widely supported providing minimum cost/risk in maintaining it till the mid-1990s. The Gran-

ite Sentry commercial software presents little risk as does the gateway bridge we will use until the other programs are modified. Finally, by the time we complete the transition in the mid to late 1990s, the ISO/OSI will have the commercial market place experience base to be maintainable at minimum cost.

Question. Was the Air Force's decision to defer use of these new protocols based on a cost benefit analysis?

Answer. In May 1988 the Air Force completed an initial cost benefit analysis to support a review of alternatives by our Requirements Review Council. A summary from that study was provided to your committee staff as part of the Nov 1988 Air Force Final Report on the CSSR program. The study analyzed a range of alternatives for implementing standard communications protocols in the CMU programs. The study found that early implementation of the new ISO/OSI protocols would affect three modernization efforts and cost an estimated $26 million with at least a six month delay in schedule. In addition, about four to six months would be required to put the ISO/OSI protocol on contract. The benefit of such an action would be achieving an early standard versus maintaining the widely used and mature TCP/IP Protocol standard. The current contractual protocol did not present any significant technical or operational risk. However, there was some increased risk in implementing ISO/OSI since it was still relatively new and commercial products were still evolving. The study further recommended that the present data protocol on contract for the CS3R program should be retained and that the SIO should develop a protocol transition plan to achieve a standard protocol configuration after planned modernization programs are implemented and stabilized.

Those recommendations were approved by the RRC. Details of the transition plans are covered elsewhere in my testimony.

COMMON MESSAGE SETS

Question. The form or format for data transmitted from sensors like radars into Cheyenne Mountain is very important. Every ballistic missile sensor has a unique "message set," but the Cheyenne Mountain computer upgrade programs are being designed to accept only certain of these formats. GAO thinks that a "common message set" is crucial. Do you agree?

Answer. While not necessarily "crucial," a common message set—or more properly, an improved message set—will enhance system operation in the future. At this time, the current TW/AA system can and does operate with a variety of message sets. We are moving toward implementation of a common message set (Standard Survivable Message Set (SSMS)) at all of the sensors, as well as Cheyenne Mountain. The CMU programs will all handle this new message set. The primary advantage of the new SSMS is its condensed bit-oriented format which facilitates its use with survivable communications. The survivability of this data is indeed crucial, and the "common message set" will improve this survivability.

Question. What progress have you made in establishing a common message set for each of the Cheyenne Mountain computer upgrades?

Answer. All the CMU programs have the requirement to handle the SSMS. All but SPADOC 4, since 4C is not on contract, have at least the April 1986 version of SSMS. We have recently (April 1989) approved an update of the SSMS which accommodates improved satellite sensor capabilities. We hope to approve full implementations of the new messages an all programs by the end of the summer.

Question. GAO says that the Air Force discovered this problem in 1985. Why has it taken so long to act?

Answer. There is no problem sending and receiving data with the messages we have today. Our concern now is increasing the survivability of the data. The decision was made in 1985 to develop a more survivable message set and the SSMS was finalized in April 1986. CSSR was beginning its source solution process at the time, and we elected to continue without SSMS to avoid award delay. All program contracts awarded after CSSR contained the new messages. Due to insufficient funding, CSSR could not pursue SSMS implementation until 1988. SSMS is now on contract for CSSR.

Question. GAO reports that "personnel from 17 directorates or working groups had met and analyzed the problem or referred it for someone else's action a total of 57 times since March 1986." Has this bureaucratic paralysis been ended?

Answer. We cannot confirm the GAO's specific numbers. Once the common message formats (SSMS) were finalized in April 86. Each new contract that was awarded, except CSSR, contained the new messages. CSSR funding issues were resolved in December 87 and ESD began working implementation on CSSR the following year. There were no delays involved in analyzing "the problem" although there were delays in actually getting SSMS on contract for CSSR. These implementation delays have been resolved and SSMS is now on contract for CSSR.

Question. What assumptions are each of the 5 Cheyenne Mountain computer programs using today in their contracts regarding message sets?

Answer. SCIS—SCIS is on contract for the April 1986 SSMS baseline. It also has a requirement to convert current message set formats at sensor sites to SSMS if necessary.

CSSR—CSSR is now on contract for the April 1986 SSMS baseline.

CCPDS-R—CCPDS-R is on contract for the April 1986 SSMS baseline.

Granite Sentry—GS is not required to handle missile warning data from sensor sites and therefore does not require implementation of the SSMS.

SPADOC—SPADOC 4A and 4B are not on contract for SSMS. We expect to standardize all programs on the April 1989 SSMS at a Requirement Review Council meeting later this summer.

Question. How much would it cost to change the acquisitions to have a common message set?

How much is requested in FY 1990 for this purpose?

How much would be needed in FY 1990 for this purpose?

Answer. The approximate cost to change all of the acquisitions to accommodate SSMS is $15 million. This would bring all programs up to the April 1989 baseline. There has been no money requested

in FY 1990 for this purpose nor do we expect to require any additional funds in FY 1990 for this purpose. Adjustments will be made through internal program reprioritization or in the FY 1992 POM if necessary.

Question. Wouldn't it make more sense to require a common message set format in each of the acquisitions in the $1.3 billion Cheyenne Mountain program rather than to retrofit them later?

Answer. As I have described in my other answers, we do plan to acquire the "common message set" (SSMS) in each acquisition program. We are not going to wait until IOC to retrofit.

Question. The Air Force has 2 types of wiring problems in Cheyenne Mountain: (1) wires and plugs that are incompatible and (2) wiring congestion. We understand you've made some progress in this area. Describe your plan and actions to date to resolve the wiring and cable congestion problems at Cheyenne Mountain.

Answer. The wiring congestion problem is to be attacked in two phases. Phase one involved removing unused cables and assessing routing problems associated with adding new CSSR cables to the remaining Tech Control cables. Phase two involves actual rerouting of existing cables and new CSSR cables in such a way as to allow installation of CSSR.

Phase one is complete as of December 1988. Over 10,000 feet of cables were removed, and the survey played a vital part in the approved installation plan. Phase two will be accomplished during implementation of the CSSR installation plan. This plan directly addresses both cable congestion and standardized interfaces.

Question. Does the FY 1990 budget request funds to resolve the wiring problem, cable congestion, and site preparation issues involved?

How much will the resolution of each issue cost and how long will it take?

Answer. The new installation plan is being implemented at this time. Of the $5 million needed to complete the effort, $3 million has been allocated from FY 1989 funds. This portion should provide for much of the parts and labor required for the rebuild effort. Approximately $0.5 million will be needed from FY 1990 funds and $1.5 million from FY 1991 and 1992 funds. These dollar requests are stretched out due to the multi-phase engineering plan required to upgrade the cables and interfaces while maintaining operation within CMAFB. This effort is fully funded within our current FY 1990 budget request.

Question. As we discussed, CSS–R currently cannot be "plugged into" the Mountain. How much will it cost to make CSS–R compatible, and is this fully funded?

Answer. The cost breakout for the rebuild efforts is as follows:

$5 million—Rebuild of the Tech Control facility to provide standardized interfaces, provide a common interface point, and rebuild the affected areas in which the CSSR will be located.

$6.5 million—Changes in CSSR cabling; stretching of the CSSR installation schedule. (This was required in order to provide time to do major modifications in the CMAFB Tech Control area.) NOTE: CCSSR Block 1 and Block 2 IOCs will not be affected. No programs which rely upon CSSR installation will be affected by this schedule.

This effort is fully funded within our current FY 1990 budget request.

Question. GAO thinks that a network security policy to cover the 5 Cheyenne Mountain computer upgrades is very important. Do you have such a policy?

Answer. Yes. It is found in DOD Directive 5200.28 and in AFR 205–16.

Question. GAO reports that the Air Force acknowledged the need for a network security policy in 1986. Is this accurate?

Answer. Air Force Space Command initiated action in February 1986 to develop a Command network security policy. This was done because of the lack of DOD or Air Force policy specifically focused on network security. DOD and Air Force had policy addressing the security of communications and computer systems but its focus was on stand-alone systems. Even with this focus, it addressed security of communications and computer systems in general, and it also addressed security of both stand-alone and networked computers. In fact, when we wrote the contract specifications for each new system, we took into account what it was to be connected to in determining the required security features.

Question. GAO tells us that a standard was developed by the Air Force Space Command but after 2 years of work, no planned milestones exist for making the security policy final. Is this accurate?

Answer. No, it is only partially accurate. A standard was not developed; a draft policy was developed. No planned milestones exist to finalize the original draft policy because national, DOD, and Air Force network security policy and guidance have all been published; it was the absence of this guidance and policy that warranted developing the Command policy.

The draft network security policy took approximately 17 months to develop. This should come as no surprise because computer security is at the leading edge of computer technology today and network security is even more esoteric than computer security.

The national network security guidance referred to below took longer than 17 months to develop; the natonal agency developing it had many more experts with greater expertise than AFSPACECOM had available to develop its draft Command policy.

In July 1987, about the same time HQ AFSPACECOM developed its draft network security policy, national guidance on network security was published. This national guidance came in the form of NCSC–TG–005 Version 1, referred to as the Red Book. It was published by the National Security Agency which evaluates commercial computer security guidance for classified processing in the Federal Government. In March 1988, a new DOD Directive 5200.28 was published, providing network security policy was further applied to the Air Force with the publication of a new AFR 205–16 in April 1989. HQ AFSPACECOM plans to develop a Command supplement to AFR 205–16 by the end of 1989; this supplement will address many security issues, one of which will be network security. However, the supplement policy on network security will have little, if anything, to add to the technical substance in the DOD and Air Force policy.

Question. How long would it take to incorporate the finished policy into Cheyenne Mountain computer upgrade contract modifications? Is this your plan?

Answer. Even if we had the final and most complete version of a network security policy in hand when we were writing the specifications in the CMAFB upgrade contracts, we would not have been able to simply include such policy in the contracts. The reason is that there would have been no commercial products which would have met those policy requirements. The same is still true today. Further, in the absence of such commercial products, we do not have the time or the money to develop them ourselves. Consequently, what we do whenever commercial products fall short of computer security policy is scale back the requirements to something that is attainable in the time and with the money available and adjust the concept of operations to the point where the risk of operating the system is acceptable.

This is exactly what we have had to do with Orange Book (DOD 5200.28–STD) requirements. The Orange Book focus is on standalone computers. The Orange Book has been available as NCSC guidance since August 1983 and as DOD policy since December 1985. Yet, even today, there are very few commercial products which meet Orange Book requirements. The NCSC Red Book, with its focus on network security, was published in July 1987, and there are even fewer commercial products meeting its requirements today. The number of commercial products meeting its requirements is growing, but it is currently wholly inadequate to support competitive procurement of high-trust systems such as CSSR and SPADOC in the CMAFB upgrades. When the time comes that commercial products do meet Orange and Red Book requirements, we will re-evaluate the situation. Until then we must continue our approach of a pragmatic combination of attainable requirements and operating practices.

Question. Can you "retrofit" security into the $1.3 billion of computer upgrades after they have been delivered? Wouldn't it be better to do so now?

Answer. The real question is whether or not additional computer security features and trust in the systems are necessary to reduce the risk of operating the upgraded systems to an acceptable level. Our opinion is that additional features and trust are desirable but not necessary, given the time and money required, the technical difficulty involved, and the known threats to the systems.

COMMITMENT TO FIX THE PROBLEM

Question. We have spent a lot of time on the Cheyenne Mountain issues this year. It looks like a long road ahead of us. Have you weighed the advantages of simply stopping the current programs and regrouping?

Answer. Yes we have. To stop current acquisition will cost the Air Force significant termination costs while only delaying development and eventual IOC of my needed capabilities. To restart our acquisitions would delay the IOC of the new capabilities beyond the support-ability timeframe of the current systems. It is simply not

prudent to do so now—our current systems won't meet mission needs, and we are confident that the existing CMC programs will.

Question. Can you assure this Committee that the modernization programs will be effectively managed, delivered on time, within the revised budgets, and will function as an integrated system at Cheyenne Mountain?

Answer. I can assure the committee that we will make every effort to do so. It must be remembered that these missions represent my most critical responsibilities as CINCNORAD and USCINSPACE, and I need those new systems to perform my missions. I am involved to ensure my operational requirements are realistic and achievable. I am confident that Lt Gen Kutyna understands the problems, has solutions, and will ensure the programs meet my requirements.

Question. What assurances can you give the Committee that the Air Force is proceeding on the most effective and efficient approach for satisfying immediate and future communications requirements at Cheyenne Mountain?

Answer. I believe the Air Force now has a firm understanding of the problems that have occurred in both the CSSR and SPADOC, and more importantly, that the Air Force and the contractor have an executable plan to complete these programs. Since I met with you in February, progress on the CSSR has been made. The contract for the facility modifications was awarded last month. The fixes to all but one of the twelve open action items reported by the GAO have been identified and the fix is ongoing.

The baseline for the SSMS message formats was approved on April 5, and I have frozen all requirements so that installation will not be further perturbed. The standard survivable message set is on contract.

Question. How will you ensure continuing oversight on this program into the 1990s?

Answer. I am personally reviewing these programs quarterly with General Kutyna and ESD. I have frozen all requirements so that the programs will not be further perturbed. General Kutyna, as I have explained, is the key individual responsible for the entire system and its end-to-end integrity. He has already described to you the additional oversight actions that he personally has implemented to ensure that the situation is under control. The increased management attention at all levels should ensure that we do not repeat the pitfalls that hampered our efforts to date.

Question. Describe in detail how FY 1990 Cheyenne Mountain funds will be used?

Answer. FY 1990 funds be used as follows:

SCIS—Conduct IOT&E at 6 sites, install, checkout and ready 15 additional systems for IOT&E.

SPADOC—Conduct DT&E and start IOT&E for block B. Complete detailed Request for Proposal for Block 4C, perform proposal review for Block 4C and prepare for contract award of Block 4C.

CSSR—Complete hardware/software integration and inplant FQT along with begin initial check installation and checkout in AFSPACECOM bldg 1840. Development Testing & Evaluation will start in Bldg 1840 and finalize site preparations within Cheyenne Mountain for blocks 1 & 2 installation.

CCPDS-R—Conduct DT&E for the common subsystem at the factory, conduct Critical Design Review for the forward user display system, install and checkout the common subsystem in AFSPACECOM bldg 1840.

GRANITE SENTRY—Complete DT&E, OT&E and declare IOC for the NORAD Command post (missile warning) upgrades. Conduct system requirements review for the NORAD Command Post (Space Defense) upgrades.

Question. What unfunded requirements do you have?

Answer. In FY 1990 none.

Question. If we elect not to terminate your program this year, what additional funds could be used to solve the problems GAO has identified (such as changing the necessary contracts to incorporate open systems standards)?

Answer. The budget request that the Air Force has provided to you for this coming year address our needs including the fixes that the Air Force and I have detailed. We are not asking for additional funds, only your support for the requested funds to permit us to proceed toward fielding these badly needed programs.

[CLERK'S NOTE.—End of questions submitted for the record.]

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